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PDEIS

PRELIMINARY DRAFT ENVIRONMENTAL IMPACT STATE

ELECTRONIC COMBAT TEST CAPABILITY

UTAH TEST AND TRAINING RANGE

DEPARTMENT OF THE AIR FORCE

UNITED STATES AIR FORCE

JULY 1989

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BLM-HQ Draft
July 12/ECTC/ls

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16 JUL 93

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PRELIMINARY DRAFT
ENVIRONMENTAL IMPACT STUDY

ELECTRONIC COMBAT TEST CAPABILITY
UTAH TEST AND TRAINING RANGE

UNITED STATES AIR FORCE

JULY 1989

COVER SHEET

Environmental Impact Statement

Electronic Combat Test Capability

Utah Test and Training Range

(TO BE PREPARED)

BLM-HQ Draft JULY 17, 1989
July 12/ECTC/mlc

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EXECUTIVE SUMMARY

In 1990, the Air Force proposes to construct an Electronic Combat Test Capability (ECTC) at the Utah Test and Training Range (UTTR) in west-central Utah (Figure ES-1). Construction of facilities and operations at the ECTC would increase gradually over the next decade, and they would be fully operational by the year 2000. The ECTC would remain an electronic testing area well into the next century.

The ECTC is a proposed field test capability to be added to the UTTR for electronic combat testing. Electronic combat is defined as "action taken in support of military operations against the enemy's electromagnetic capabilities." Modern weapons systems are relying more and more heavily on electronic tracking, guidance, and response systems. The ECTC is intended to test the effectiveness of those electronic systems in realistic operating conditions.

The basic components of the ECTC are as follows:

1. Manned "threat" systems (simulators) that send out the electronic signals of enemy radar systems, communications, passive detection systems, and jamming equipment;

2. Communication links connecting these threat systems which enable them to be operated as they would by an enemy;

3. Controlled airspace which allows aircraft role-playing both enemy ("red") and friendly ("blue") systems to maneuver freely during the course of tests;

4. Instruments that collect information about all the airborne and the ground-based components involved in the test;

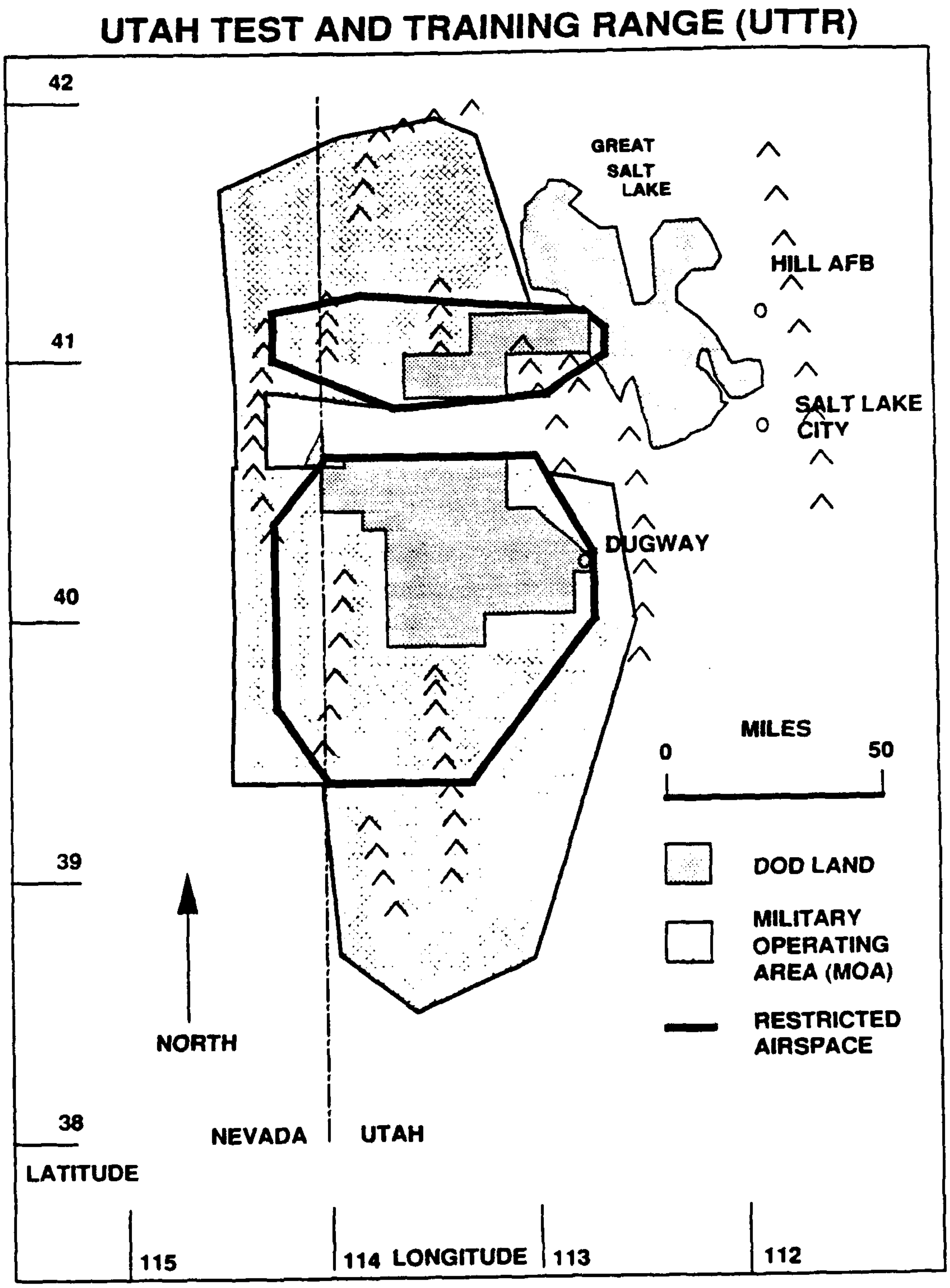

Figure ES-1. Utah Test and Training Range (UTTR).

5. A mission control center at Hill AFB and range maintenance facilities at various locations around the UTTR.

This Environmental Impact Statement (EIS) was prepared to facilitate the following interrelated decisions: whether or not to proceed with the ECTC at the UTTR; the selection of locations for components of the ECTC; and the specific impacts of initial, 1990 and 1991 construction activities.

This EIS is a "programmatic" document - that is, it evaluates the anticipated impacts of the ECTC in its entirety and at its target capability, to the extent that future requirements of the program are known. Because construction and other specifics are only known for the first few years, only 1990 and 1991 components will be evaluated in detail; long-term components will be addressed more generally. Specific environmental evaluations of long-term components will be "tiered" from the EIS as needed. Tiering means covering general impacts in a broad, program-wide analysis and then following up with more detailed environmental analyses in accordance with the National Environmental Policy Act (NEPA) and its implementing regulations.

PURPOSE AND NEED FOR ACTION

The purpose of the ECTC is to provide a field test environment that realistically simulates battlefield conditions facing modern weapon systems. The ECTC would subject test articles to a comprehensive, integrated array of electronic combat (EC) and other systems and the doctrine governing how those systems would be used by an enemy.

The ECTC is needed to ensure that U.S. aircraft and other weapons systems can perform effectively in an electronic combat environment. It is currently possible to test aircraft and other systems to verify how fast they can fly, how much they can carry,

and so on. There is, however, no place where systems can be adequately tested to determine how well they would perform in combat conditions. Operational test and evaluation, which attempts to answer this type of question, needs such a place.

Experience in Southeast Asia in the 1960s and early 1970s demonstrated the need for more realistic operational test and evaluation. Much of the equipment employed there had not been adequately tested and did not work as expected. The U.S. lost many aircraft in that conflict. The costs of inadequate operational testing, both in personnel and in equipment, are high.

Since that time, the environment that U.S. forces would face in a combat situation has changed dramatically. The forces available to potential adversaries have increased rapidly and become much more sophisticated. This, combined with the trend toward relying more and more on complicated electronics in modern aircraft, has increased the need to test weapons systems in conditions resembling actual combat.

Available test and evaluation capabilities have not kept pace with advances in weapons systems technology, resulting in growing uncertainty about how well the weapons systems that are being developed really perform. The Department of Defense (DOD) has been criticized for not testing new weapons systems under realistic enough conditions to ensure that they could meet the challenge of combat if it became necessary. As a result of this widening gap between weapons systems performance and operational test and evaluation capability, the Air Force identified the need for a test range with resources capable of supporting realistic operational test and evaluation in electronic combat. The ECTC is the response to this need.

The focus of the ECTC is electronic combat - to test and evaluate the operations of aircraft and weapons systems that might be affected by electromagnetic signals used for targeting, jamming, or data manipulation. Electronic combat testing primarily uses the electronic signals transmitted by aircraft and the threats they encounter, rather than the weapons themselves.

It is important to operate these systems in as realistic a setting as possible in order to test how they interact with other things around them. The ECTC would simulate realistic electronic combat environments and provide meaningful information that cannot be obtained through other test methods and techniques, such as laboratory tests and computer models. This information is vital to deciding whether to acquire new weapons systems, by making sure new systems can really perform as intended before they are bought in quantity. The ECTC would also be able to support tactics development and training exercises.

The goal in developing the ECTC is to provide maximum flexibility to respond to future technological developments, so that the Air Force can continue to conduct realistic testing into the next century.

SUMMARY OF PROPOSED ACTION AND ALTERNATIVES

The ECTC Arena

The ECTC arena is designed to simulate successive layers of an enemy's defenses ranging from the front line through various levels of tactical, second-echelon, and rear-area defensive zones, to a simulated target deep within enemy territory. This arena covers a distance of about 80 miles. The various levels of defense zones are grouped into "tactical threat areas (TTA)," "intermediate threat areas (ITA)," and "strategic threat areas (STA)." However,

the ECTC arena is more accurately characterized as a continuous defense system comprised of individual threat sites with integrated command and control communications reflecting a concept known as "defense-in-depth." The threat areas must be arranged to reflect the doctrine of defense-in-depth, which identifies their location and spacing (Figure ES-2).

Description of the Narrowing Process

The Air Force initiated a narrowing process for the ECTC by identifying a group of 29 candidate locations in the continental United States that met the minimum operational requirements to support the ECTC. These candidate locations were screened by applying exclusionary criteria that eliminated those with inadequate land or airspace to support the ECTC. Eight ranges remained and were evaluated with regard to mission compatibility, capacity for accommodating ECTC operations, operational suitability, and potential for conflict with environmentally sensitive areas. The UTTR was determined to be the only range that met the criteria.

The UTTR is an existing test and training range located in the Great Salt Lake Desert and operated by the Air Force Flight Test Center (AFFTC). The UTTR complex includes approximately 600,000 acres of DOD-controlled lands, restricted airspace, and military operations areas, some of which are over public land managed by the U.S. Bureau of Land Management (BLM), the State of Utah, and private land owners. The UTTR consists of two large ranges: the North Range and South Range.

The UTTR region was evaluated to identify configurations of the ECTC that would fit the operational requirements of the ECTC arena.

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UTAH TEST AND TRAINING RANGE (UTTR)

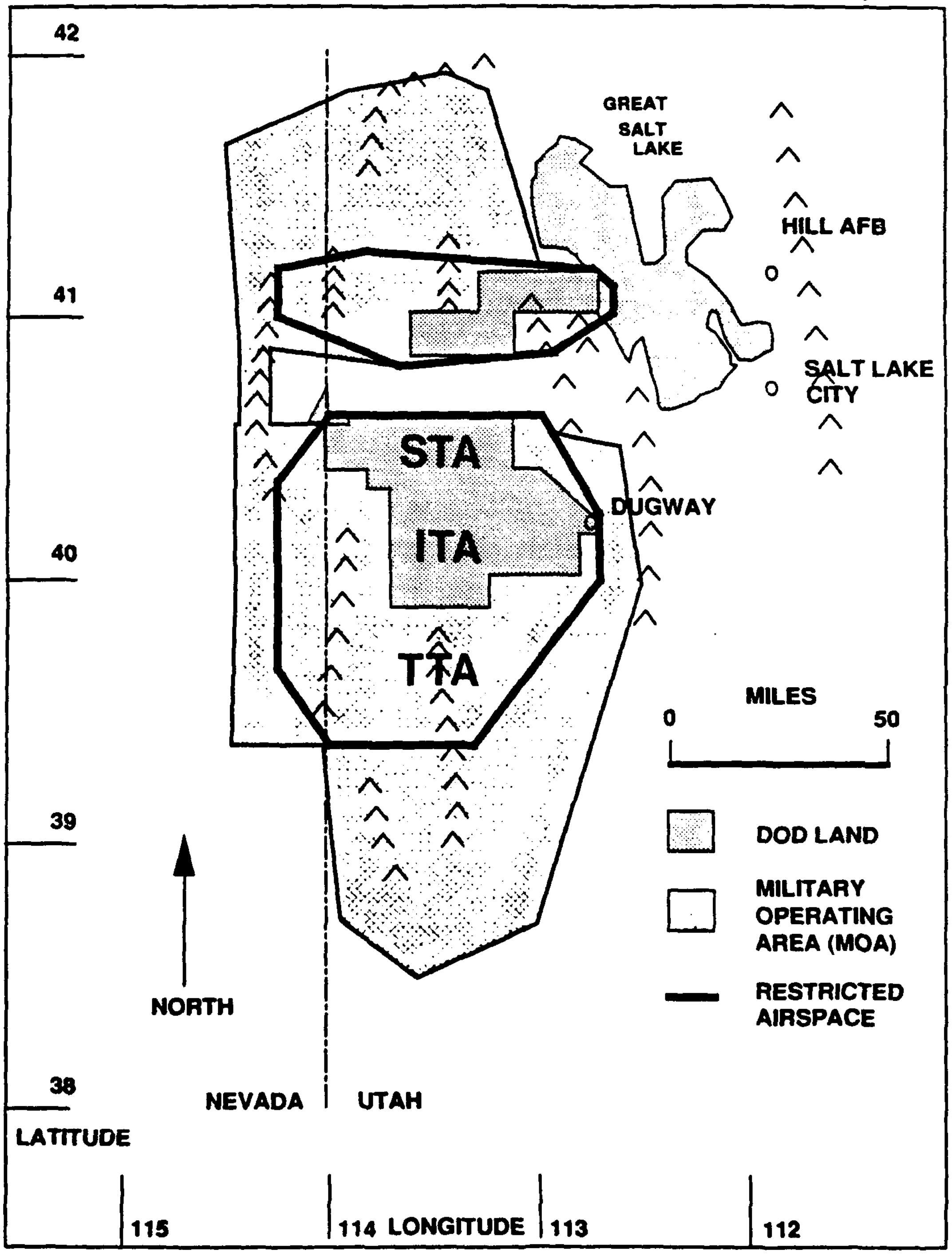

Figure ES-2. Proposed operational areas.

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Among the factors considered were (1) the location of DOD land, (2) appropriate topography for location of threat sites, (3) population, (4) access to threat sites, (5) security, (6) safety, and (7) airspace requirements. Airspace requirements can only be met using a north-south orientation; this requirement can only be met on the South Range. The requirement for sites associated with the STA to be at least partially on DOD land makes it mandatory that the STA be located in the north, and the TTA be located in the south. After applying the defense-in-depth doctrine, three potential valleys were found to have suitable configuration for the potential TTA locations. These are Tule, Snake, and Whirlwind valleys.

A similar narrowing process was employed for the identification of alternative bases to be used for staging of aircraft activity. Staging bases are locations where aircraft using the ECTC take off and land. The narrowing process evaluated the region within a 75-mile distance of the ECTC arena for suitable staging locations. Exclusionary and evaluative criteria assessing operational suitability, construction feasibility, and mission and land use conflicts were used to identify candidate staging bases. The evaluation narrowed the candidates to seven existing airfields in the region: Hill Air Force Base (AFB), Michael Army Airfield (AAF), Salt Lake City International Airport (SLC), and Wendover, Delta, and Fillmore municipal airports.

Overview of Proposed Action and Alternatives

The proposed action is to implement the ECTC by constructing the ECTC arena at the UTTR with support facilities and personnel located at Hill AFB, Sand Pass, Wendover, Michael AAF, and Frisco Peak. The ECTC arena will consist of 100 "threat sites" - sites where enemy defense simulator systems can be placed. These simulators are known as "threat systems." 70 of 100 sites would

be located in Tule Valley, with the remaining 30 sites in the Great Salt Lake Desert. Alternatives to the proposed action involve locating 70 sites in one of two alternate valleys, Snake Valley or Whirlwind Valley. The other 30 sites would remain in the same location. Figure ES-3 shows the potential locations of the ECTC threat sites and support facilities. The following discussion summarizes the proposed action and alternatives, including alternative staging approaches, alternatives considered but eliminated, and the no-action alternative.

DESCRIPTION OF PROPOSED ACTION

Facilities and improvements

Threat sites

The ECTC requires 100 sites where threat systems can be brought in, parked, and operated. Seventy TTA sites will be located in the Tule Valley with 10 ITA and 20 STA sites in the Great Salt Lake Desert. The general arrangement and relationship among the sites are determined by the requirement to simulate anticipated battlefield conditions. They will be sited on relatively level, stable land with a reasonably good view of the surrounding area.

Although the exact configuration may vary, each site will generally consist of an area measuring 100 to 150 ft by 100 to 150 ft. The area will include three pads for locating the threat systems and an operations and maintenance trailer. The sites will contain instrumentation, electrical power, and fiber-optics communications. A livestock fence will surround the site. A typical threat site is illustrated in Figure ES-4.

UTAH TEST AND TRAINING RANGE (UTTR)

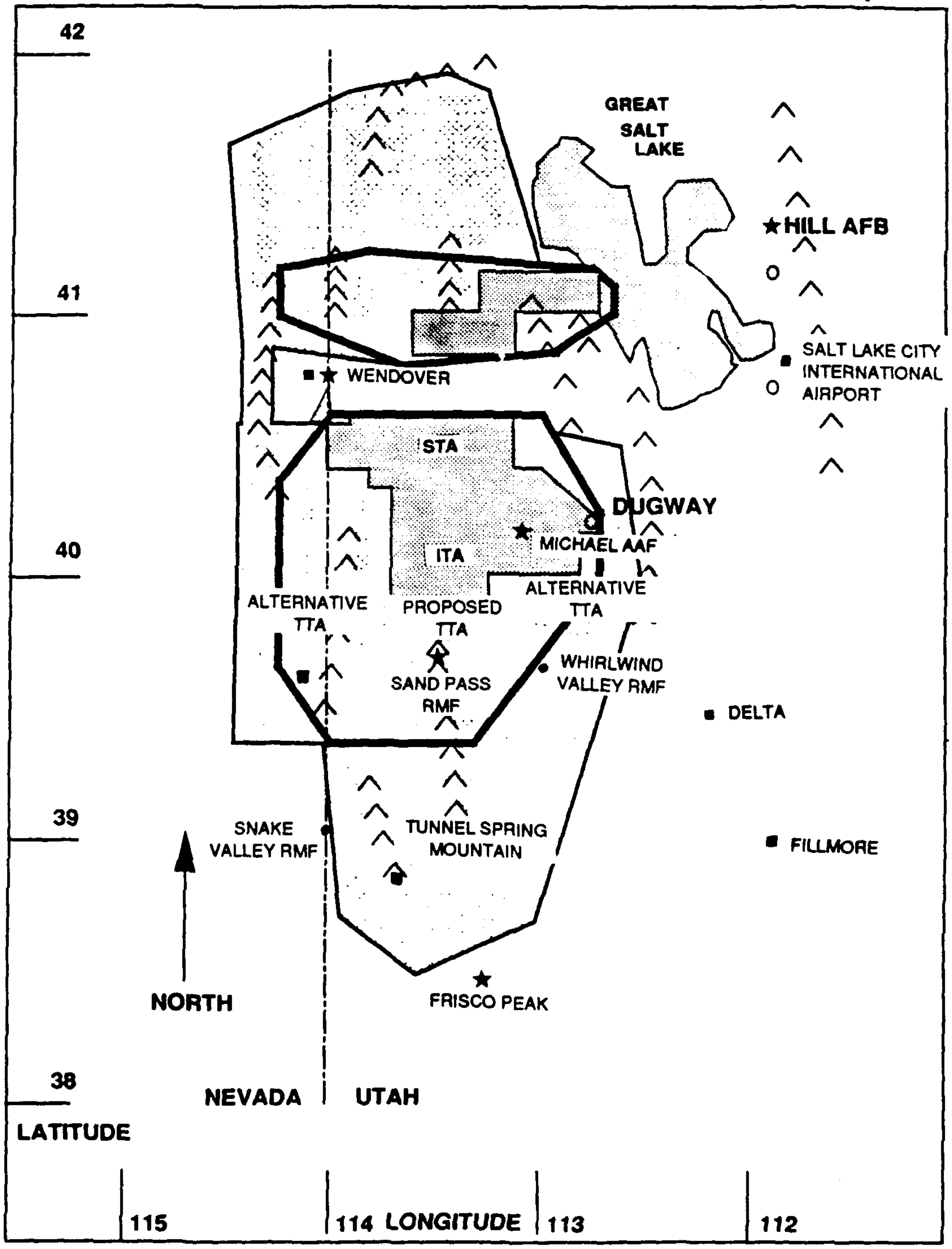

Figure ES-3. Potential locations of ECTC threat sites and support facilities.

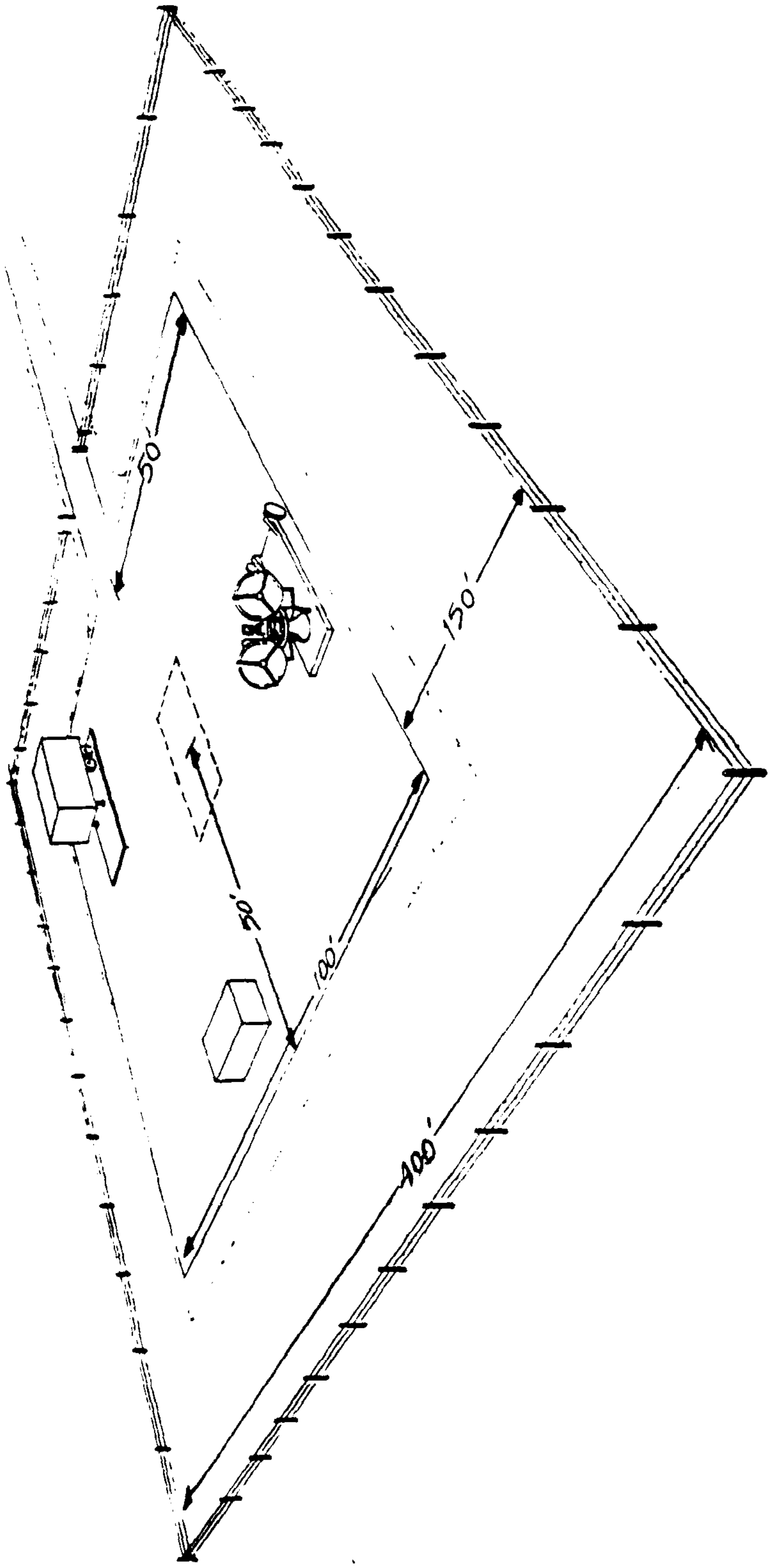

Figure ES-4. Typical threat site.

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Range maintenance facilities (RMFs)

Two range maintenance facilities (RMFs) will be constructed to provide reasonably rapid response for operations, maintenance, and security of the threat sites and other range systems. One RMF will be located near Sand Pass to support the TTA and surrounding area. The second RMF will be developed at Wendover to support the STA and surrounding area. These facilities would be combined maintenance depots, warehouses, and enclosed work area. Helicopter hangars would be included to support rapid threat system repair and range security alert. Existing facilities at Michael AAF will be used to support the ITA sites.

Potable water will initially be trucked to all construction sites until a deep well and water-treatment facilities are constructed at Sand Pass. Wastewater at the range maintenance facilities would be discharged to septic tanks and leach fields, whereas chemical toilets would be installed at the threat sites. Industrial wastes will be stored temporarily in approved containers and then hauled to Hill Air Force Base for subsequent disposition.

Gapfiller radar

The ECTC will involve low-altitude aircraft approaches in the South Range. Low-altitude radar coverage is currently not available over all of the UTTR, generating the requirement for a "gapfiller" radar for air traffic control, clearance, and safe separation between test participants and nonparticipants, including civilian aircraft in the vicinity.

The Gapfiller radar facility will consist of a standard AN/ASR-9 FAA air traffic control radar. It will initially be linked to air traffic control through microwave. Eventually, the gapfiller radar will be tied in with fiber-optics lines. The proposed location for

the gapfiller radar is Frisco Peak. There is a mining camp located at Frisco Peak, and it has existing access roads with nearby power.

Fiber optics

Most communications on the range will be connected by a fiber-optics network. This is to prevent the test data from being affected by the electrical energy that is transmitted by the threat systems and test aircraft during operations. The fiber-optics network will extend from a Mission Control Center (MCC) at Hill AFB to the RMFs and the gapfiller radar site. From the RMF, the fiber-optics lines will fan out to each threat site. Where possible, the lines will follow existing roads to minimize ground disturbance. The lines will be buried approximately four feet below ground by a trenching machine.

Road requirements

Roads are required for movement of threat system, instrumentation, and equipment to and from threat sites, as well as for access by range O&M personnel. Threat site locations will make maximum use of existing roads. Approximately 196 miles of existing gravel roads will be upgraded as main access roads for the ECTC. Secondary roads (spurs) will lead from the main access roads to the individual threat sites. Approximately 216 miles of gravel spur roads will be upgraded or constructed. The only road to be paved is the existing dirt road from Sand Pass to Route 272, a distance of approximately 15 miles.

Power requirements

Electric power to the range facilities will be provided by a new power line to be constructed on the east side of Tule Valley from an existing line. Power to the threat sites will initially be

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provided by generators, but will ultimately be provided by a combination of above- and below-ground power lines extending from a substation to be constructed at the Sand Pass RMF.

High-accuracy multiple-object tracking system (HAMOTS)

The ECTC requires accurate time, space, position information (TSPI) on all participants. A data collection system transmitting real-time TSPI to the MCC is critical to the ECTC. Current plans are to use the existing HAMOTS at the UTTR and augment and expand the system as needed to support the ECTC. The HAMOTS consists of small microwave stations scattered over the range. About 50 additional HAMOTS stations would be required for the ECTC to provide coverage to the TTA. HAMOTS equipment could also be located at ECTC threat sites.

HAMOTS equipment is self-contained and consists of a 10 to 15 ft portable mast that sits on the ground and is held in place by guy wires weighted with concrete blocks. The mast may include a single whip-type antenna, a side-oriented microwave dish, and an additional up-looking dish. Power is provided by small solar panels and a battery pack. No ground preparation is required, and the units can be removed and relocated. The equipment can be installed by helicopter and does not need road access.

Security requirements

A range security program is needed to protect high-value, sensitive pieces of equipment used in ECTC tests. Each threat site will be equipped with intrusion alarms. Approximately seven security cameras will be located at key road intersections in the valley so that security personnel at the RMF can monitor traffic leaving the area if an intrusion alarm is triggered.

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Mission control center (MCC) and technical support facilities

A new MCC would be constructed at Hill AFB. Adjacent to the new MCC would be three technical support facilities. Other facilities, including hangars and maintenance facilities, could be constructed at Hill AFB to support ECTC staging operations.

Construction schedule

The threat sites and support facilities will be constructed over a seven- to eight-year period starting in 1990 and leading to a full capability around the year 2000. Construction will start with 10 to 13 TTA sites in 1990. Figure ES-5 illustrates the major construction phases.

Operations

Use of the ECTC would increase over the next decade as the capability developed to its full level. The ECTC is expected to support about 75 missions in 1991, increasing to about 200 missions in 1993, and could reach a maximum level of approximately 1,500 missions per year by the year 2000. A mission may include from one to a dozen aircraft role-playing a set of battlefield scenarios in the ECTC arena. A single mission could last as little as 10 minutes or as long as a couple of hours. This translates into about 100 flying hours on the UTTR in 1991, growing to about 2,000 flying hours on the range in the year 2000. This would be an increase of about 30 percent over current operations at the UTTR in the year 2000. ECTC users will be various DOD organizations.

During the initial years, ECTC missions will be accommodated in the current eight hours per day, five days per week operation. By target capability, ECTC operations could expand to at least two

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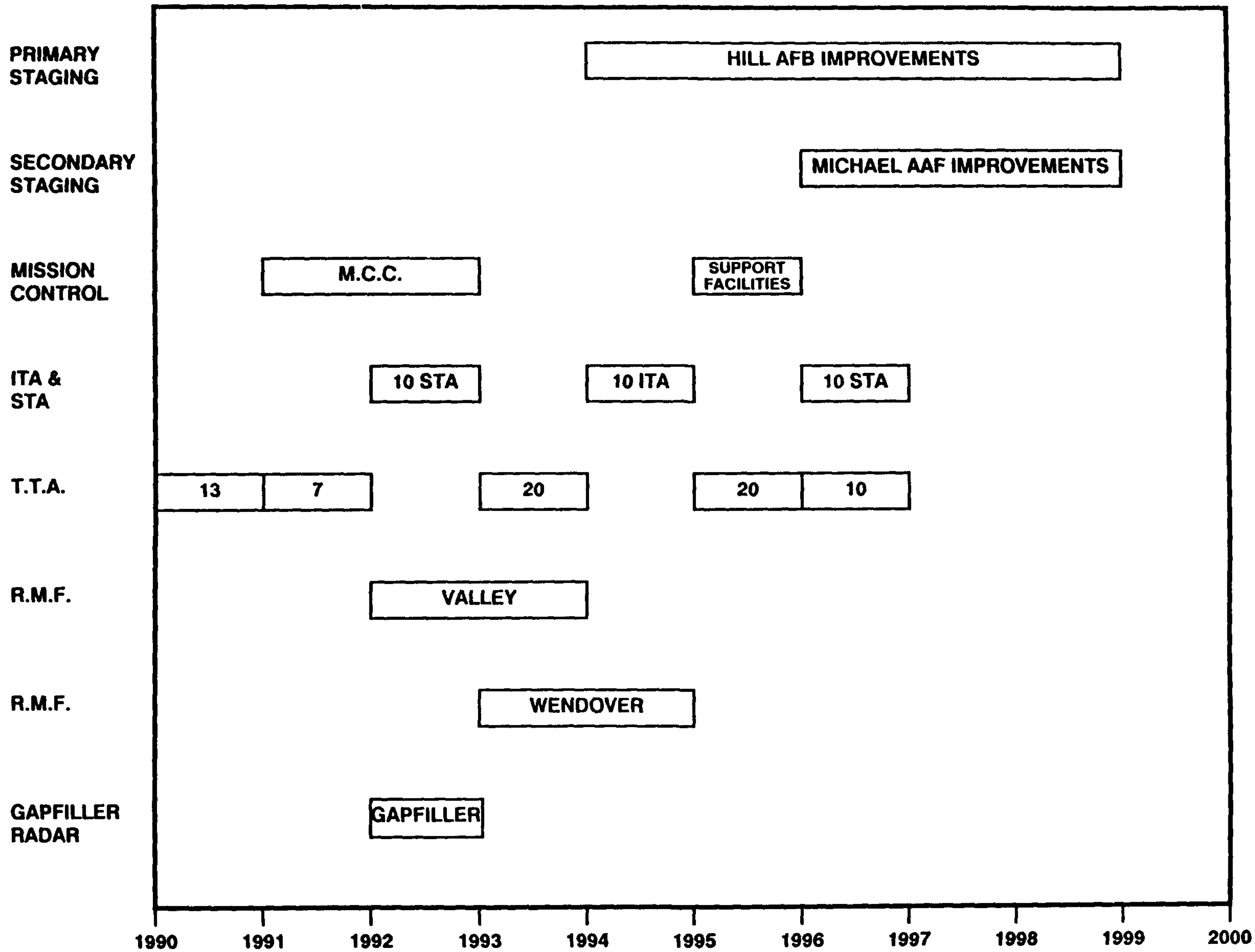

Figure ES-5. ECTC construction schedule.

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eight-hour shifts per day, five or six days per week, and may involve occasional weekend use. Approximately 30 percent of the missions will fly at night between the hours of 10:00 P.M. and 7:00 A.M.

In a typical ECTC test, the test aircraft would take off from one or more staging bases, enter the ECTC arena from the south, descend to low altitude (as low as 100 ft above the ground) to avoid radar detection, and fly over or close to the TTAs in Tule Valley. The aircraft would remain at low altitude while flying northward over the ITAs and STAs. The aircraft could then either return to the staging bases or ascend to high altitude, fly southward, and enter the range for another test. In addition to the ground-based threats, some missions would encounter simulated enemy aircraft. Some missions might also require aerial refueling, and could include a number of support aircraft, such as the airborne warning and control system (AWACS) aircraft, as shown in Figure ES-6.

Some missions would include countermeasures such as electronic jamming and releases of chaff and flares. Chaff and flares are employed to "confuse" electronic targeting systems and radar. They could be used anywhere in the ECTC arena. Chaff are fibers that are about an inch long and thick. When bundles of them are released from an aircraft, they show up as a cloud on radar screens, thereby obscuring the aircraft so it cannot be targeted. Flares are released from aircraft to confuse heat-seeking guidance systems. Only self-protection flares would be used at the ECTC. These are made of plastic and metal and weigh one to three ounces. They burn out completely after ignition while they are in the air, so they do not pose a fire hazard. In addition to the chaff and flares, non-hazardous lasers would be used by some aircraft during ECTC missions.

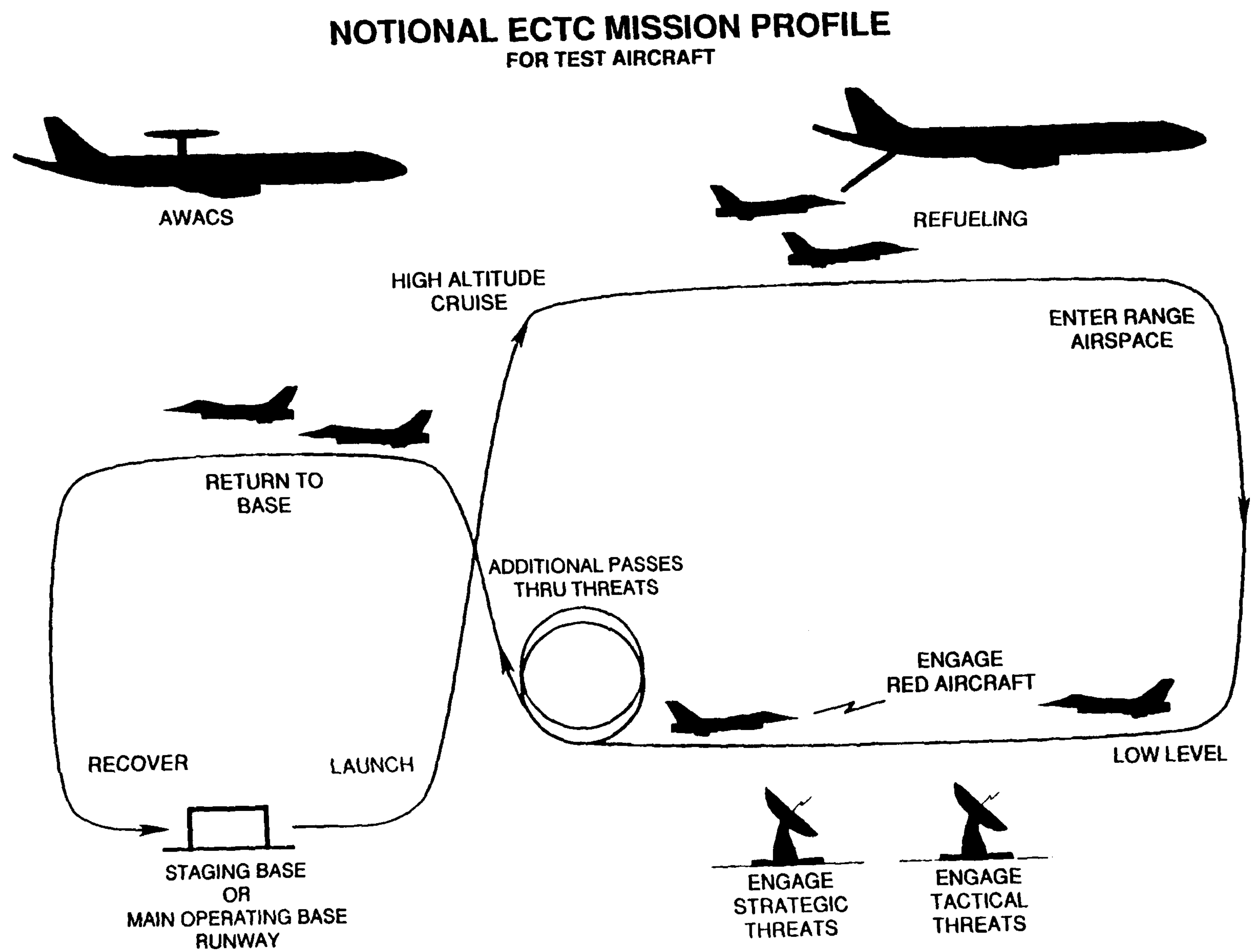

Figure ES-6. Typical mission scenario.

In general, the purpose of the ECTC is to simulate an electronic battlefield, so the majority of ECTC missions would not involve releasing or firing weapons with live warheads. Some missions could involve releasing inert ("dummy") bombs or missiles. Because they are inert, there are no warheads attached. Some of them have rocket boosters or small smoke charges (called "spotting charges" because they make it possible to spot where the missile or bomb impacted). A small percentage of the ordnances will be live. This is the extent to which ordnance would be used in connection with the ECTC, and it would be confined to approved areas of DOD land, where such activities currently occur. No bombs or missiles would be dropped or fired to impact on non-DOD land.

Many ECTC missions would involve aircraft flying as low as 100 ft AGL and at high subsonic speeds. This fits within the current allowances of the existing restricted airspace and military operations areas. There would be some supersonic flight associated with the ECTC, but the ECTC does not require additional supersonic airspace or corridors outside the existing supersonic operating area. There would be an increase in the number of supersonic flights within the supersonic operating area. The increase is expected to be well within the limits that the Air Force established for the Gandy extension.

Occasionally, aircraft accidentally go supersonic outside the supersonic operating area. This happens today at the UTTR and can be expected to occur with ECTC missions as well. Any property damage caused by these incidents would be covered by the Air Force claims process, which is handled at Hill AFB.

There are aircraft currently capable of supersonic flight at low altitude. However, the ECTC program has no defined test requirements that cannot be met by flying at high altitude subsonic speeds or at supersonic speeds in currently authorized supersonic

airspace. As the performance of aircraft continues to improve, however, future tests may require more supersonic operating area. Although no change is required for the ECTC as currently planned, an extension of supersonic airspace over more of the ECTC arena may be pursued at some time in the future. If such a requirement is proposed, an environmental analysis with full public participation will be conducted and reviewed by the Air Force before a decision is made to go forward with additional supersonic airspace.

The ECTC can coexist with public use of the land, so there is no requirement to withdraw more land. Most ECTC missions would not restrict public access or transportation through the range. As is current practice, civilian air travel in restricted airspace would require clearance from UTTR control (Clover Control). Road access could be temporarily restricted (approximately two hours) through Tule Valley during some tests for safety reasons, but this would be the exception rather than the rule. There would be prior notice and coordination with local authorities. In the initial years, road closures would occur only a couple of times per year, and in the long term, they might be expected to occur about once a month. Once the ECTC is in place, a call-in system will be established to provide information about road closures.

About 650 ECTC personnel will work permanently at Hill AFB by the year 2000, with about 200 people working permanently at various locations throughout the range. Operational and maintenance personnel would be deployed daily from the RMFs to the threat sites based on testing schedules. Most of the personnel conducting the tests themselves would be temporarily assigned to the UTTR; these assignments could last as long as four months. The number of temporary personnel associated with the various tests could be as high as 1,200 to 1,700 at one time.

ALTERNATIVES TO THE PROPOSED ACTION

Alternative operational areas must meet the same criteria and have the same relationship to one another as the proposed action. Therefore, alternative TTAs must be considered in terms of how they pair up with the STA.

As an alternative to the proposed location, the TTA could be located in either Snake Valley or Whirlwind Valley. The ITA and STA locations for these alternatives would be the same as for the proposed Tule Valley configuration.

Snake Valley alternative

The TTA would be located north of U.S. Route 50. The RMF for the TTA would be located on the Utah-Nevada border approximately four miles north of U.S. Route 50 on the Utah side. This facility would be the same as described for the Sand Pass location. The RMF for the STA would be at Wendover, like the proposed action. For this alternative configuration, the gapfiller radar could be located in the Tunnel Springs Mountains. The other facilities for this alternative would be the same as for the proposed action.

Whirlwind Valley alternative

The TTA would be located east of the Fish Springs Mountains and south of the Fish Springs National Wildlife Refuge. The threat site configuration would be skewed to the northeast to avoid overflight of the refuge. The RMF for the TTA would be located two miles from the intersection of the road running from Nephi to Sand Pass and the road to Delta. This facility would be the same as described for the Sand Pass location. The RMF for the STA would be the same as the proposed action, as would the gapfiller radar.

The other facilities for this alternative would also be the same as for the proposed action.

Alternative staging bases

ECTC missions will require a variety of aircraft and personnel staged from different locations. These staging requirements can be met by a primary base with a number of secondary support bases or locations. Some support aircraft will originate from and return to bases outside the UTTR area: this is referred to a remote staging. The selected staging base locations are shown in Figure ES-7. Seven basic staging approaches have been developed:

1. Hill AFB as the primary staging location, with Michael AAF for secondary staging and remote bases as support locations.

2. Primary staging at Michael AAF and secondary staging from Hill AFB and remote bases in support.

3. Primary staging at Salt Lake City International Airport (SLC), with secondary staging from Hill AFB and Michael AAF and remote bases in support.

4. Primary staging at Wendover, with secondary staging from Hill AFB and Michael AAF and remote bases in support.

5. Primary staging at Delta, with secondary staging from Hill AFB and Michael AAF and remote bases in support.

6. Primary staging at Fillmore, with secondary staging from Hill AFB and Michael AAF and remote bases in support.

7. Primary staging at remote bases, with secondary staging from Hill AFB and Michael AAF.

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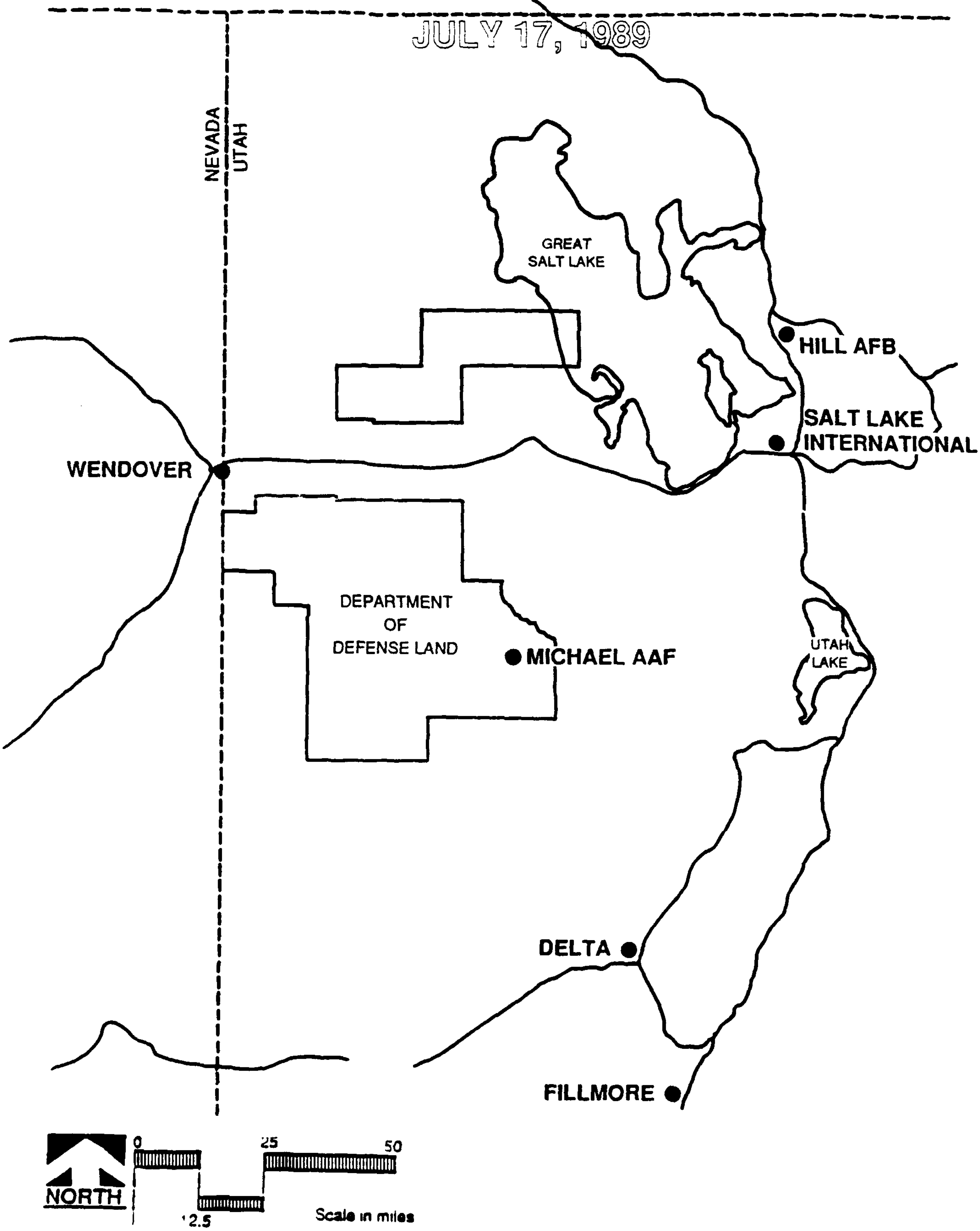

Figure ES-7. Selected staging-base alternatives.

Alternatives considered but eliminated from detailed study

Development of a new range to support the ECTC program was considered as an alternative during the range-narrowing evaluation, but the estimated cost of land acquisition and construction of necessary facilities would be billions of dollars. In addition to the high cost, several years would be required to acquire the land and design and construct a new range.

A delay in the selection of a range for the ECTC program was considered and found to be an unreasonable alternative, based on the critical need for an adequate electronic combat capability. The General Accounting Office has issued several reports criticizing operational testing in the DOD for lack of realism. A delay in the program would continue to present unacceptable acquisition risk for weapons systems currently under development.

No action alternative

Without an ECTC, the Air Force would be unable to effectively test the performance of new weapons systems against potential threats. The UTTR would continue to be used for aircraft testing and training as it is currently, and other projected programs at UTTR and Hill AFB would still be implemented as planned.

COMPARISON OF ENVIRONMENTAL EFFECTS AMONG THE PROPOSED ACTION AND ALTERNATIVES

This section compares the environmental effects for each level of decision-making supported by this EIS. The environmental information contained in the first three subsections is limited to information that discriminates among alternatives or is required for a particular decision. The fourth subsection contains

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environmental effects that are not major impacts and that do not vary among alternatives.

Placement of the ECTC in the UTTR

The following major environmental effects are expected if the ECTC is developed in the UTTR regardless of the staging base or valley chosen. The only alternative to placing the ECTC in the UTTR is the no-action alternative.

Noise

Additional noise generated by ECTC aircraft will cause annoyance to people in the affected area during both the daytime and the nighttime. Human startle effects are likely to occur, possibly leading to health and safety problems. An example of such an effect is the accidental discharge of a firearm by a hunter who is startled by the rapid onset of aircraft noise. Minor structural damage to old and weakened buildings is possible.

Ecological resources

Jet noise could adversely affect some animal species. Radio-frequency emissions from some threat simulators will be hazardous to airborne species (i.e., birds, owls, and bats) for distances of several hundred feet from the simulator. A few birds, owls, or bats are likely to be killed over the life of the program. Increased human activities and aircraft noise will adversely affect some critical wildlife habitat and associated wildlife population.

Unique Federal lands

Additional noise generated by ECTC aircraft will degrade the wilderness characteristics of wilderness study areas (WSAs) along

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and near the flight paths required for test activities. The ECTC may be incompatible with the BLM's mandate to manage WSAs to preserve their wilderness characteristics.

Socioeconomics

Depending upon the staging base alternative chosen, approximately 850 to 1,000 permanent jobs will be created by the year 2000. Additionally, approximately 1,250 to 1,700 individuals will be temporarily assigned to the region during ECTC operations phase. In addition, between 1,150 and 1,700 secondary jobs will be created. Regional spending due to construction will be approximately \$80 to \$140 million. Operations will be approximately \$44 million per year when the ECTC reaches maturity. The major adverse socioeconomic impact is degradation of the lifestyle of people in the selected valley due to day/night annoyance from aircraft noise and temporary road closures.

Valley selection

Table ES-1 compares the major environmental impacts expected to occur from the ECTC within the proposed and alternative valleys. Valley selection will occur in 1990 and the first 13 initial operating capability (IOC) tactical threat sites would be constructed in 1990.

Primary staging-base selection

Table ES-2 compares the major environmental impacts expected to occur from the ECTC at the proposed and alternative primary staging bases. Construction of a primary staging base would begin in 1994, with operations beginning in 1996. Until that time, staging will be conducted from Hill AFB and Michael AAF.

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Table ES-1. Programmatic level environmental effects pertinent to valley selection (tactical threat areas to gapfiller radar sites).

Resource	Tule Valley (proposed)	Snake Valley	Whirlwind Valley
Air quality	No major impacts.	No major impacts.	No major impacts.
Ecological resources	o Jet noise could adversely affect some animal species. Long-term impacts are uncertain.	(Same as Tule Valley)	(Same as Tule Valley)
	- - - -	- - - -	o Jet noise could adversely affect a major migratory waterfowl resting and nesting area (Fish Springs National Wildlife Refuge).
	- - - -	o Construction could adversely affect Least Chub and waterfowl habitat.	- - - -
	o Radio-frequency emissions from some threat sites would be hazardous and sometimes fatal to birds, bats, and ground animals at distances of several hundred ft from these threat sites.	(Same as Tule Valley)	(Same as Tule Valley)

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Table ES-1. Programmatic level environmental effects pertinent to valley selection (tactical threat areas to gapfiller radar sites) (Continued).

Resource	Tule Valley (proposed)	Snake Valley	Whirlwind Valley
Ecological resources (continued)	o Daily presence of large numbers of range personnel traveling to and from threat sites and RMF could adversely affect some animal species and their habitat.	(Same as Tule Valley)	(Same as Tule Valley)
Unique Federal lands	o ECTC may be incompatible with management of Wilderness Study Areas by the Bureau of Land Management.	(Same as Tule Valley)	(Same as Tule Valley)
	- - - -	- - - -	o ECTC may be incompatible with management of the Fish Springs National Wildlife Refuge by U.S. Fish and Wildlife Service.
Cultural resources	- - - -	o Major adverse impacts possible to Native American cultural resources.	(Same as Snake Valley)

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Table ES-1. Programmatic level environmental effects pertinent to valley selection (tactical threat areas to gapfiller radar sites) (Continued).

Resource	Tule Valley (proposed)	Snake Valley	Whirlwind Valley
Air space	No major impacts.	No major impacts.	No major impacts.
Noise	o Parts of west-central Utah would become much noisier, especially during the night when 30% of ECTC missions would be conducted.	(Same as Tule Valley)	(Same as Tule Valley)
Land use	o ECTC may not be compatible with public use of land, particularly recreation (see "Unique Federal Lands").	(Same as Tule Valley)	(Same as Tule Valley)
Socio-economics	- - - -	o Significant adverse impacts in Baker and Garrison due to stresses on community services from range workers choosing to live in these towns. Major impacts to lifestyles of residents of these towns can be expected.	- - - -

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Table ES-1. Programmatic level environmental effects pertinent to valley selection (tactical threat areas to gapfiller radar sites) (Continued).

Resource	Tule Valley (proposed)	Snake Valley	Whirlwind Valley
Water resources	No major impacts.	No major impacts.	No major impacts.
Health and safety	- - - -	o ECTC operations may cause major interference problems with radio, television, and other communication systems.	(Same as Snake Valley)
	o Microwave emissions from some threat sites could be hazardous to people in vicinity (see "Ecological Resources" for effects on wildlife).	(Same as Tule Valley)	(Same as Tule Valley)

Table ES-2. Programmatic level environmental effects pertinent to primary staging base selection.

	Hill AFB (proposed)	Michael Army Airfield	Salt Lake City International Airport	Wendover Airfield	Delta Airfield	Fillmore Airfield
Air quality	Increase in hydrocarbon emissions (a precursor to ozone) in a county *currently in violation* of ozone				Approximately 5.6% increase in county emissions for HC (a precursor to ozone), but no violation of ozone standard	Same as Delta
Ecological	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives
Unique Federal lands	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives
Cultural resources	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	Historic property on National Register	No major impacts under any alternatives	No major impacts under any alternatives
Air space	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives
Land use	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives

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Table ES-2. Programmatic level environmental effects pertinent to primary staging base selection (Continued).

	Hill AFB (proposed)	Michael Army Airfield	Salt Lake City International Airport	Wendover Airfield	Delta Airfield	Fillmore Airfield
Noise	Residential population potentially annoyed by increased airport noise		Residential population potentially annoyed by increased airport noise	Large increase in residential population potentially annoyed by increased airport noise		Large increase in residential population potentially annoyed by increased airport noise
Socio-economics	Primary and secondary jobs created	Jobs created Shortage of education personnel	Jobs created	Jobs created Shortage of education personnel and possibly facilities Shortage of housing Water-delivery shortage if current planned increases in system capacity are not made	Jobs created Shortage of education personnel	Jobs created Major shortage of education personnel Shortage of housing Shortage of community service personnel Impacts to rural lifestyle
Water resources	No major impacts	No major impacts	No major impacts	No major impacts	No major impacts	No major impacts
Health and safety	No major impacts	No major impacts	No major impacts	No major impacts	No major impacts	No major impacts

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Comparison of initial operational capability implementation in each valley

Construction in 1990 to develop an initial ECTC capability would include 10 to 13 tactical threat sites with their spur roads, and necessary improvements of existing fiber optics lines along the roads to the site for the respective RMF. Buried electrical cables and fiber-optics line will also be installed along some roads for future use. The selected site for the range maintenance facility will be used as a staging area for construction and interim operations and maintenance.

Preconstruction surveys were conducted at each of the 13 threat sites in each valley to determine potential impacts from construction. Surveys included the following:

1. Ecological Resources

   - Threatened and Endangered (T&E) Species
   - Candidate (possible T&E) Species
   - Species of Local Concern
   - Seasonal Use Areas and Critical Habitats

2. Cultural Resources

   - Archaeological Resources
   - American Indian Traditional Cultural and Religious Values

Ecological resources may be affected as follows:

- The Snake Valley RMF and Tule Valley Sites 1B, 1F, and 1I were all relocated due to operational considerations after the May 1989 survey for T&E blooming plants.

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Since it is only possible to identify certain T&E species while they are in bloom, it is not possible to attest to the existence of several T&E plants at these sites.

- Snake Valley tactical threat sites S3A, S3B, and S5D lie near a critical Least Chub habitat at Twin Springs. Construction and operation of these sites as presently planned could affect the Least Chub (T&E species) and other waterfowl using the area, due to lost or degradation of habitat, human interference, and electronic emissions.

Known archaeological resources will not be significantly affected by land disturbance associated with construction of initial threat sites in any valley. American Indian traditional cultural and religious values would be more affected under the Snake or Whirlwind valley alternative than under the proposed action because more American Indian ancestors lived in these valleys and more spirits would be disturbed by construction activities.

ENVIRONMENTAL IMPACTS THAT DO NOT VARY AMONG PROPOSED ACTION AND ALTERNATIVES

Environmental impacts that do not vary among alternatives or influence major programmatic decisions include:

- Fugitive dust during construction and operations.

- Noise from diesel-powered generators at threat sites until sites are hooked up to utility lines.

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- Potential for impacts to cultural resources and American Indian traditional cultural values at STA sites located near Cedar Mountain.
- Potential for impact on Wendover Field which is on the National Register of Historic Places.
- Minor reduction in civilian aircraft accessibility to UTTR airspace in the South Range.
- Reduction in public accessibility/mobility in the South Range due to an estimated 12 road closures per year, 2 hours per closure.
- Possible impact to grazing animals due to noise and electronic simulators.
- Possible but extremely improbable impact to humans using high-powered binoculars caused by aircraft laser usage.

MITIGATION

Mitigation measures capable of reducing the environmental impacts previously described are identified below. Additional measures are specified in this EIS. These measures are additional to any provisions required by permit and approval agencies such as the BLM, the State of Utah, the Federal Aviation Administration (FAA), the Federal Communications Commission (FCC), and other federal agencies. Some measures are contingent on location of the activity. Measures include the following:

- Controlling fugitive dust during construction, if required.

- o Reducing road width by placing trenching of fiber-optics lines at edges of roads.

- o Placing electric transmission lines underground.

- o Avoiding critical wildlife habitats.

- o Minimizing the use of electrical generators, maintaining generators to minimize noise, and enclosing generators, if required.

- o Minimizing flyovers of WSAs, Fish Springs National Wildlife Refuge, populated areas, and other sensitive receptors.

- o Avoiding archaeological resources and places of traditional cultural value to American Indian people; if that is not possible, developing a plan for data recovery and handling.

- o Instructing personnel as to the sensitivity of cultural resources.

- o Minimizing civilian restrictions to restricted airspace and the public land within the UTTR, South Range.

- o Minimizing noise emissions during construction, and applying temporary noise barriers, if required.
- o Developing new or expanded flight-avoidance zones over sensitive receptors that would be affected by ECTC overflights.

- o Minimizing night-flying activities near inhabited areas.

- o Adjusting departure and arrival procedures associated with staging bases to minimize noise impacts.

- Providing noise insulation for the most severely impacted residences, if required.

- To the extend practical, locating any new runways required at staging bases so as to minimize noise.

- Selecting sites and construction materials to minimize visual impacts.

- Maximizing the hiring of local workers.

- Scheduling activities to reduce cumulative impact, to the extent possible.

- Providing assistance to affected counties for the maintenance of gravel roads supporting ECTC activities, if required.

- Coordinating with local communities to ensure adequate housing.

- Siting and operating threat systems to avoid hazards from electromagnetic energy.

- Locating threat sites to minimize the hazards of electronic simulators.
- Relocating homes located in incompatible zones around the Delta and Fillmore airports, if required.

PUBLIC SCOPING PROCESS

The purpose of scoping was to identify the significant issues for study in the EIS, and to determine the scope of the research for each issue. Scoping activities were undertaken in accordance with

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the Environmental Impact Analysis Process (EIAP) collected from Federal, state, and local government organizations prior to scoping. Scoping meetings with the public and governmental organizations were conducted during November 1988. A wide range of issues related to the physical and social environment, including safety considerations, were identified through the scoping process and have been incorporated into the analysis.

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Chapter 1
PURPOSE AND NEED FOR ACTION

1.1 PURPOSE OF THE ECTC PROGRAM

The purpose of the Electronic Combat Test Capability (ECTC) is to provide a field test environment that realistically simulates battlefield conditions facing modern weapons systems. The ECTC would subject test articles to a comprehensive, integrated array of electronic combat (EC) and other systems and the doctrine governing how those systems would be used by an enemy.

The ECTC is needed to ensure that U.S. aircraft and other weapons systems can perform effectively in an electronic combat environment. It is currently possible to test aircraft and other systems to verify how fast they can fly, how much they can carry, and so on. There is, however, no place where systems can be adequately tested to determine how well they would perform in combat conditions. Operational test and evaluation, which attempts to answer this type of question, needs such a place.

Experience in Southeast Asia in the 1960s and early 1970s demonstrated the need for more realistic operational test and evaluation. Much of the equipment employed there had not been adequately tested and did not work as expected. The U.S. lost many aircraft in that conflict. The costs of inadequate operational testing are high, both in personnel and in equipment.

Since that time, the environment that U.S. forces would face in a combat situation has changed dramatically. The forces available to potential adversaries have increased rapidly and have become much more sophisticated. This, combined with the trend toward relying more and more on complicated electronics in modern

aircraft, has increased the need to test weapons systems in conditions resembling actual combat.

Available test and evaluation capabilities have not kept pace with advances in weapons-systems technology; this has resulted in growing uncertainty about how well the weapons systems being developed really perform. The Department of Defense (DOD) has been criticized for not testing new weapons systems under sufficiently realistic conditions to ensure that they could meet the challenge of combat, if it were to became necessary. As a result of this widening gap between weapons systems performance and operations test and evaluation capability, the Air Force identified the need for a test range with resources capable of supporting realistic operational test and evaluation in electronic combat. The ECTC is the response to this need.

The focus of the ECTC is electronic combat; to test and evaluate the operations of aircraft and weapons systems that might be affected by electromagnetic signals used for targeting, jamming, or data manipulation. Rather than using weapons, electronic combat testing primarily uses the electronic signals transmitted by aircraft and the threats they encounter.

To test how these systems interact with other things around them, it is important to operate them in a realistic setting. The ECTC would simulate realistic electronic combat environments and would provide meaningful information that cannot be obtained through other test methods and techniques, such as laboratory tests and computer models. This information is vital to deciding whether to acquire new weapons systems by making sure new systems can perform as intended before they are purchased. The ECTC would also be able to support tactics development and training exercises.

The goal of developing the ECTC is to provide maximum flexibility to respond to future technological developments, so that the Air Force can continue to conduct realistic testing into the next century.

1.2 REASONABLE ALTERNATIVE-NARROWING PROCESS

The Air Force has developed an Environmental Impact Analysis Process (EIAP) to ensure compliance with the National Environmental Policy Act (NEPA) of 1969 and its implementation regulations. In order to identify reasonable alternatives for implementing the ECTC, the Air Force initiated an area-narrowing process for the ECTC by identifying a group of potential locations in the continental United States that met the minimum requirements to support the ECTC. Figure 1-1 illustrates the stages of the narrowing process. To be considered, a location must have restricted airspace, some DOD-controlled land, and a military airfield within 75 miles. These requirements limited potential location selections to the 29 existing military ranges used for aircraft testing and/or training listed in Table 1-1.

After the potential locations were identified, exclusionary criteria were used to eliminate those that were clearly not appropriate for the ECTC. The exclusionary criteria were either the nonavailability of adequate airspace and land area, or the inability tc obtain adequate additional airspace or land in time to support program schedules. To accommodate realistic testing, both the land and airspace must be part of a range that is controlled for military testing and/or training.

STAGES OF THE NARROWING PROCESS

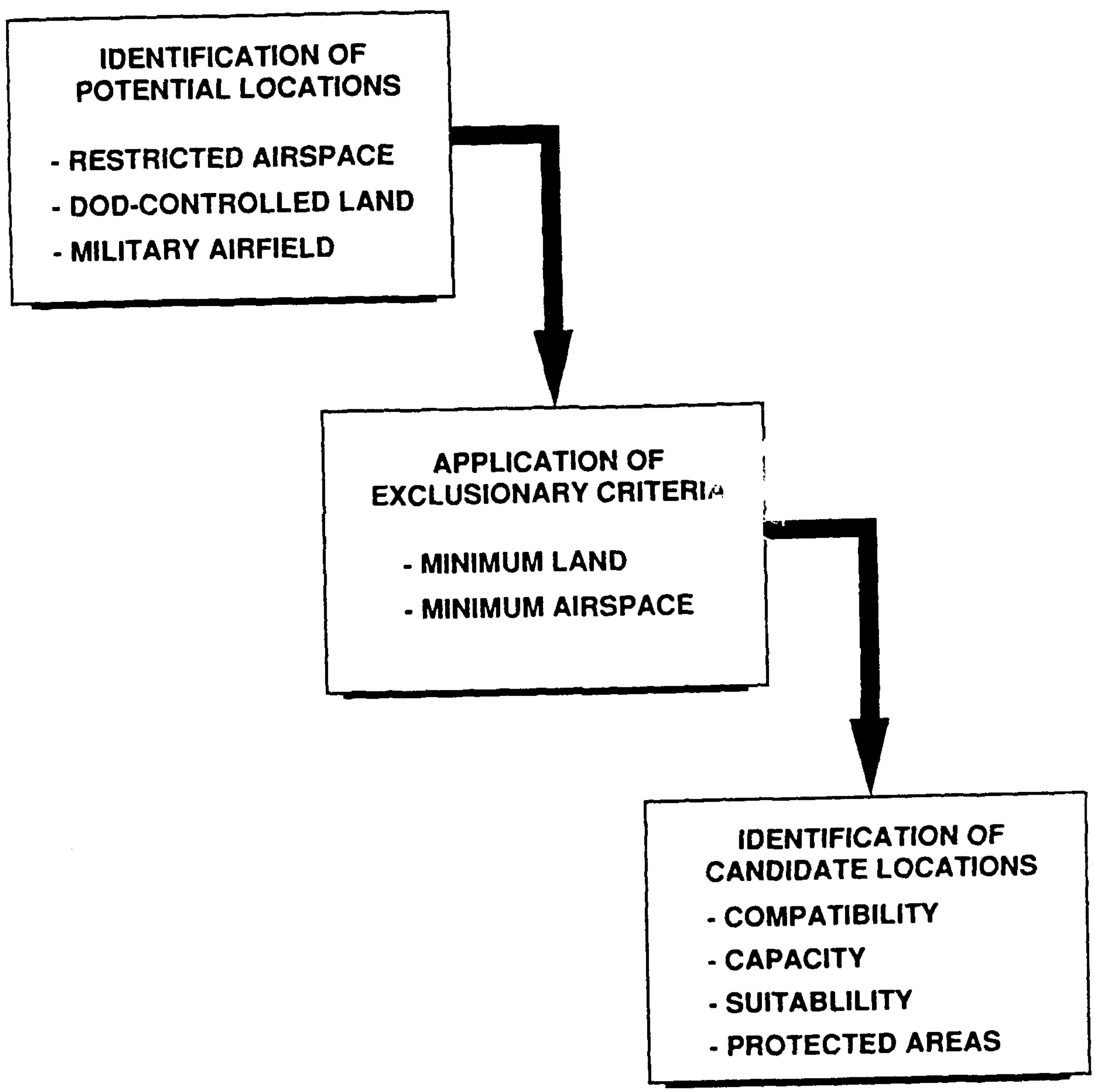

Figure 1-1. Narrowing process for range selection for ECTC program.

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Table 1-1. Candidate range alternatives.

Air Force Ranges

Barry M. Goldwater Air Force Range (BMGAFR)/Luke AFB, AZ
Air Force Flight Test Center (AFFTC), Edwards AFB, CA
Western Space and Missile Center (WSMC), Vandenberg AFB, CA
Avon Park/ MacDill AFB, FL
Eastern Space and Missile Center (ESMC), Patrick AFB, FL
Southeastern Test and Training Area (SETTA), Eglin AFB, FL
Saylor Creek Range/ Mountain Home AFB, ID
Smokey Hill Range/ McConnell AFB, KS
Shelby Range/Keesler AFB, MS
Seymore Johnson AFB, NC
Warren Grove Range/McGuire AFB, NJ
Melrose Air Force Range/ Cannon AFB, NM
Tactical Fighter Weapons Center (TFWC) Range/ Nellis AFB, NV
Utah Test and Training Range (UTTR)/ Hill AFB, UT

Army Ranges

Fort Chaffee, AR
Fort Huachuca, AZ
Yuma Proving Ground, AZ
Fort Irwin Training Center, CA
Fort Polk, LS
Aberdeen Proving Ground, MD
White Sands Missile Range (WSMR), NM
Fort Drum, NY
Fort Sill, OK
Fort Bliss, TX
Fort Hood, TX

Navy Ranges

El Centro Naval Air Facility, CA
Marine Corps Air Ground Combat Center Twenty-Nine Palms, CA
Naval Weapons Center (NWC) China Lake, CA
Naval Air Station (NAS) Fallon Range, NV

Space requirements for the ECTC are as follows:

- o Ground space: approximately 15 to 20 by 80 miles for placement of the threat simulator systems and related equipment resulted in a threshold requirement of approximately 1,400 square miles.

- o Airspace: approximately 50 by 150 miles must be available from 100 ft above ground level (AGL) and must be superimposed over the ground space. The available airspace must also extend beyond the superimposed area to allow for potential standoff distances of 120 miles between test and threat aircraft, and there must be 60 miles separation between test aircraft and ground-based threat systems. A threshold requirement of approximately 50 by 150 miles of combined restricted and military operations area (MOA) airspace was used to screen the existing ranges.

Locations with insufficient land and/or airspace were examined for the feasibility of expansion to meet the requirements. If expansion was found to be infeasible or impractical because of development, land use, land-ownership patterns, or airspace usage, the location was eliminated from further consideration.

Eight ranges or combinations of contiguous ranges remained following the application of the exclusionary criteria. These are shown in Figure 1-2. They were evaluated against a set of criteria that measured their performance according to the following principal factors: mission compatibility with the ECTC; capacity for accommodating ECTC operations; suitability for meeting ECTC technical and physical requirements; and potential for conflict with protected, environmentally sensitive areas. Each candidate was rated as acceptable, marginal, or unacceptable with respect to

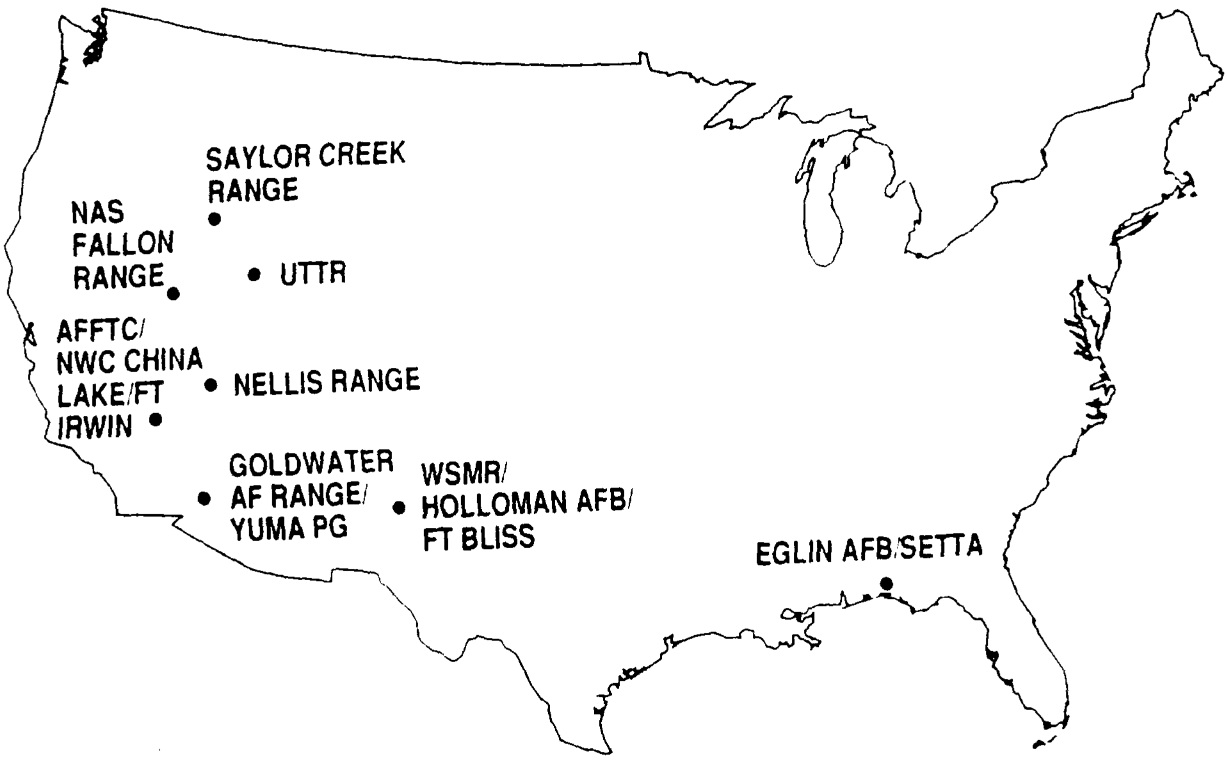

Figure 1-2. ECTC siting candidates.

each factor. Unacceptable performance relative to any factor rendered an alternative unacceptable for the ECTC.

Results of applying the evaluation criteria indicated that the UTTR is the only range capable of absorbing the ECTC mission without significantly disrupting current uses. It is also the only range sufficiently capable of supporting the ECTC without some mission degradation, due either to poor terrain masking or to lack of suitable infrastructure. Overall, it is the only reasonable alternative for the ECTC mission.

Figure 1-3 illustrates how the eight candidate locations rated against the evaluation criteria. The principal failings of the unacceptable alternatives are summarized in the following:

- The primary conflict at the Barry M. Goldwater Air Force Range (BMGAFR) and Yuma Proving Ground complex, located in southern Arizona, is mission incompatibility. BMGAFR is dedicated to training tactical fighter air crews, which is a high-volume, rapid turnover operation. The extensive time required to configure and reconfigure the range between ECTC tests would completely disrupt the training mission. Yuma Proving Ground is dedicated to Army Testing, which is also incompatible with the ECTC, and is not large enough for the ECTC. Both ranges are heavily used and could not accommodate the projected ECTC workload. In addition, they either contain or border a number of wildlife ranges and other sensitive areas, including the Cabeza Prieta Wildlife Refuge, which is the habitat for the endangered Sonoran Desert Pronghorn Antelope.

- The Air Force Flight Test Center (AFFTC), the Naval Weapon Center (NWC) China Lake, and Fort Irwin National Training Center comprise a complex of contiguous airspace in

CRITERIA	RANGE ALTERNATIVES							
	GOLD-WATER/ YUMA PG	AFFTC/ NWC/ FT IRWIN	EGLIN AFB/ SETTA	SAYLOR CREEK	WSMR/ FT BLISS/ HOLLOMAN	NELLIS	UTTR	NAS FALLON
COMPATIBILITY	U	U	A	U	U	U	M	U
CAPACITY	U	U	U	M	U	U	A	U
SUITABILITY	M	M	U	U	M	A	A	U
PROTECTED AREAS	U	A	U	U	M	M	M	M

LEGEND:

- A ACCEPTABLE
- M MARGINAL
- U UNACCEPTABLE

Figure 1-3. Evaluation of ECTC siting options.

California. The AFFTC is located at Edwards AFB and includes base facilities, a precision impact range area, a rocket propulsion laboratory, and numerous other test facilities that would be totally disrupted by the ECTC. Similarly, Fort Irwin involves large-scale Army ground maneuvers that are mutually exclusive with the ECTC. Although the mission of the NWC is similar to the ECTC, the scope of ECTC operations would preclude concurrent operations by other missions. Because of the inability to conduct parallel missions with the ECTC, the complex does not have the capacity to accommodate the ECTC without displacing the existing missions.

o The Southeastern Test and Training Area (SETTA) at Eglin AFB, Florida, is completely unsuitable for the ECTC because the majority of the airspace lies over water. In addition, the SETTA currently has problems accommodating demand for its use. Eglin AFB contains and is contiguous with a number of recreation areas, including the Gulf Island National Seashore.

o Saylor Creek Range in Idaho is dedicated to training, which makes it incompatible with the ECTC, but its principal shortcoming is that existing land and airspace are totally insufficient to accommodate the ECTC. Although there is potential for expansion, the time required to acquire additional land and airspace would preclude meeting a reasonable schedule for the ECTC. Expansion is further constrained by surrounding sensitive land-use areas, including wilderness areas, state parks, and conservation areas.

o The White Sands Missile Range and Fort Bliss complex in New Mexico and Texas, respectively, support a wide variety of

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test, evaluation and training missions. Several of these, including the Radar Target Scatter facilities, could not be conducted if ECTC operations were ongoing. The White Sands Missile Range airspace is heavily used, and requests for some programs are frequently denied. Current training missions would be displaced eventually by test missions. Capacity is inadequate to absorb the ECTC.

- The primary mission of the Tactical Fighter Weapons Center (TFWC) near Nellis AFB, Nevada, is training, and the ECTC would not be compatible with this critical mission. Utilization of the TFWC range averages 93 to 97 percent. It is one of the most heavily utilized ranges in the U.S. Crowding and airspace use conflicts are long-standing concerns. Given the current saturation, adding an ECTC mission is not feasible.

- Naval Air Station (NAS), Fallon Range is completely devoted to training and is incompatible with the ECTC mission. The range is organized to accommodate a high-volume, rapid turn-around mission that would conflict with the ECTC's high-technology mission. The time required to reconfigure the range for ECTC tests would unacceptably impair the Navy's training. The Fallon range has inadequate capacity to accommodate the ECTC requirement. The range is also unsuitable for the ECTC arena. Airspace and land availability are marginal, and the terrain does not provide adequate terrain masking.

1.3 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

In addition to other ranges, development of a new range to support the ECTC mission was considered early in the planning of the ECTC. However, the anticipated cost of acquiring land and constructing

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the necessary facilities to develop a new range with electronic combat test capabilities would be prohibitive. In a time of austere military budgets, it would be most difficult to justify the development of a new range when existing alternatives are available. In addition to the high cost, several years would be required for land acquisition, design, and construction of a new range, which would further postpone the availability of a realistic operational test capability for evaluation of new weapons systems.

A delay in the selection of a range for the ECTC program was also considered and found to be an unreasonable alternative, based on the critical need for adequate electronic combat operational test and evaluation. The General Accounting Office (GAO) has issued three reports in the last two years citing problems with DOD operational test and evaluation. In the most recent report, the GAO concluded that inadequate testing has resulted in misinformation about the capabilities of six weapons systems. The GAO criticized the tests for not providing a realistic test environment. The ECTC program has been developed to aid in the elimination of these deficiencies. Any delay in ECTC implementation will severely degrade 1990s acquisition efforts and would severely impair test and evaluation of future weapon systems.

1.4 UTTR DESCRIPTION

The UTTR is an existing Air Force range where a variety of aircraft testing and training takes place. It is a major range and test facility that is operated and maintained for DOD test and evaluation activities by the AFFTC. As shown in Figure 1-4, the range is located in the Great Salt Lake Desert, approximately 70 miles west of Salt Lake City, Utah. Within the UTTR airspace is Dugway Proving Ground (DPG), an important U.S. Army test facility. Together, the UTTR and DPG consist of almost 600,000 acres of land withdrawn from public use by the DOD.

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UTAH TEST AND TRAINING RANGE (UTTR)

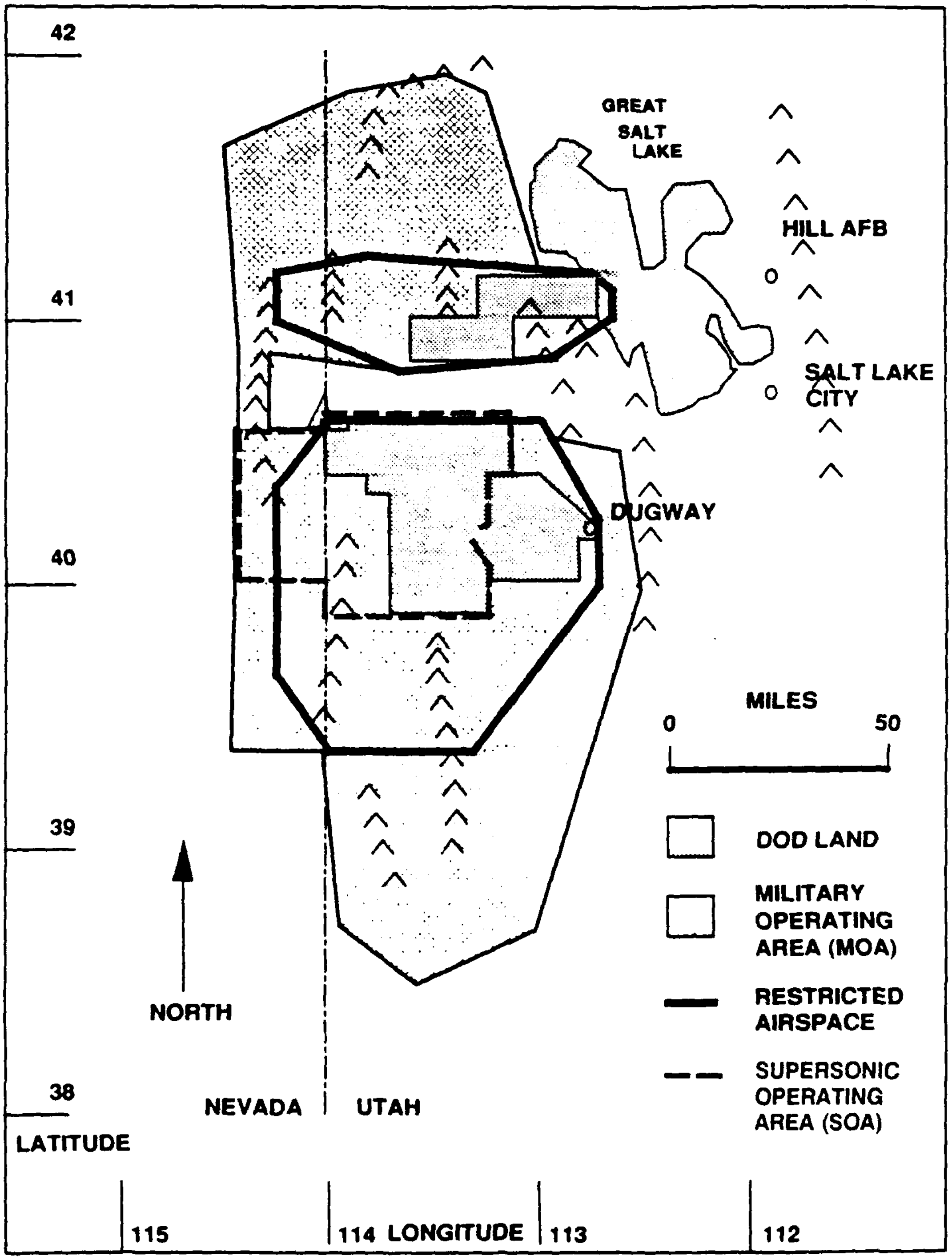

Figure 1-4. Utah Test and Training Range (UTTR).

The DOD-withdrawn land within the UTTR contains a variety of structures and other improvements, including buildings used for operating and maintaining the range, Michael Army Airfield (AAF), various targets, instruments, and other facilities used for testing and training. The land space is characterized by high-country deserts, migrating sand dunes, mountains rising abruptly from the desert floor, and rolling hills building up to mountain ranges. The land beneath UTTR airspace that is not owned by the DOD is controlled by the Bureau of Land Management (BLM), the State of Utah, and private property owners. UTTR airspace includes "restricted" airspace where civilian aircraft access is prohibited without express permission, and MOAs, where military operations are conducted. The airspace covers an area about three to four times the size of the DOD land and is divided into two large ranges: the North Range and South Range.

The UTTR provides range facilities for all phases of test and evaluation of manned- and unmanned-aircraft systems and tactical training for air-to-air and air-to-ground weapons delivery for the DOD and other government agencies. The UTTR is operated and controlled from an existing mission control center (MCC) at Hill AFB. In addition to planning and managing tests, personnel in the MCC control the restricted airspace [much as the Federal Aviation Administration (FAA) controls unrestricted airspace] and monitor air traffic in the MOAs.

1.5 RELATIONSHIP OF THE ECTC PROGRAMMATIC EIS TO THE DECISION-MAKING PROCESS AND FUTURE ENVIRONMENTAL ACTIVITIES

If carried forward, the ECTC program will evolve over the next decade. Only the facilities constructed in the earliest years of the program have been planned in detail. Nevertheless, rational decision-making requires an awareness of the total environmental consequences of a proposed action, including the potential impacts

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of the fully operational program. That is the purpose of a programmatic Environmental Impact Statement (EIS), such as this one, which is based on a generalized project description that attempts to bound the reasonably foreseeable actions associated with the ECTC program. As site-specific decisions are made in the future, based on the evolving needs of the program, they will be examined in the context of the programmatic findings; and further evaluation and documentation will be performed, as needed, in accordance with the EIAP.

This EIS provides information on the environmental consequence of the following decisions:

- Whether or not to proceed with the ECTC program at the UTTR. This decision will consider the findings of the EIS at the programmatic level.

- Selection of a configuration for development of the ECTC test area and associated infrastructure. There are three alternative configurations possible at the UTTR. The EIS provides comparative environmental information for consideration in this decision.

- Selection of location at which aircraft using the ECTC can take off and land on "stage." There are seven staging alternatives under consideration. This EIS provides comparative environmental information for consideration in this decision.

- Whether or not to proceed with the construction and operation of the initial facilities as currently planned. This EIS provides site-specific information on the critical environmental factors applicable to siting initial

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facilities in each of the three alternative configurations of the ECTC test area.

The programmatic EIS will act as an "umbrella" evaluation of the environmental consequences of the ECTC program as a whole. Specific environmental evaluations of evolving components of the program will be "tiered" from the EIS as needed. Tiering is provided for in Council on Environmental Quality (CEQ) regulations implementing NEPA. It means covering general impacts in a broad, program-wide analysis and then following up with more detailed environmental analyses as the specifics of the program are better defined.

At a minimum, future environmental activities will include preconstruction surveys and appropriate mitigation measures. Should evolution of the ECTC program result in a proposed action with environmental consequences that are not within the bounds of this programmatic EIS, the Air Force will conduct additional environmental analyses as may be required prior to any decision to proceed with the program as modified.

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Chapter 2
ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 OVERVIEW

2.1.1 THE ECTC PROGRAM

The ECTC is a field test capability proposed to be added to the UTTR for electronic combat testing. Electronic combat is defined as "action taken in support of military operations against the enemy's electromagnetic capabilities." Modern weapons systems are relying more and more heavily on electronic tracking, guidance, and response systems. The ECTC is intended to test the effectiveness of those electronic systems in realistic operating conditions. The region of the UTTR that will be developed and used for ECTC testing is referred to as the "ECTC arena."

The ECTC arena will subject test aircraft to simulations of the airborne and ground-based threats they would encounter if they were to fly through enemy territory in a combat situation. By using a realistic simulation of combat conditions, the Department of Defense (DOD) can determine how well its weapons systems can perform under actual operating conditions and develop operational techniques that will enhance the use of these systems.

The ECTC arena requires the following capabilities in order to conduct realistic operational testing (Figure 2.1-1):

1. Use of discrete parcels within an area of land approximately 80 miles long and 15 to 20 miles wide where equipment simulating enemy ground threats can be located.

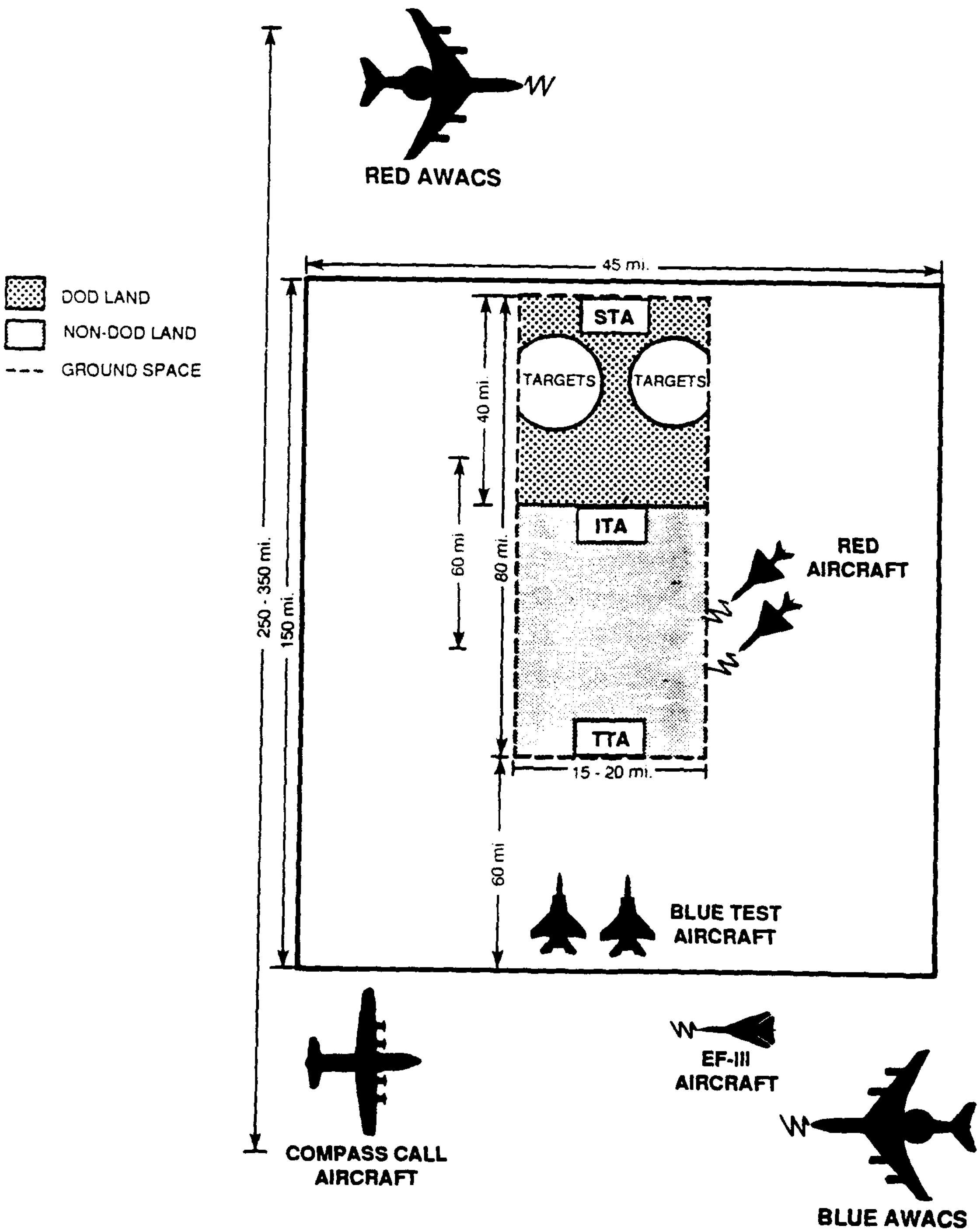

Figure 2.1-1. Land/airspace concept.

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2. Special use airspace approximately 150 miles by 45 miles where military aircraft using the ECTC can operate at low levels without interfering with private air traffic.

3. ECTC-related aircraft must also be able to fly over a 250 to 350 mile area, although the airspace utilized does not need to be specified for military use.

4. A communications system able to collect real-time data about test participants so test results can be analyzed. This system must be able to collect accurate real-time data on both ground and airborne participants and must provide time, space, and position information (TSPI).

5. A center where missions on the ECTC can be planned, controlled, and analyzed (a mission control center).

6. An airfield where military aircraft using the ECTC can fly in and out (staging base).

The UTTR is an existing Air Force range where a variety of aircraft testing and training takes place. It is a Major Range and Test Facility Base (MRTFB), which means it is operated and maintained for DOD test, evaluation, and training. The DOD-withdrawn land within the UTTR contains a variety of structures and other improvements, including buildings used for operating and maintaining the range, Dugway Proving Ground, Michael Army Airfield (AAF), various targets, instruments, and other facilities that are used for testing and training.

The range encompasses over 20,000 square miles of airspace that is specially designated for military use. This airspace includes restricted areas, which are controlled by the DOD, and military operations areas (MOAs) that are under the control of the Federal

Aviation Administration (FAA) but in which military operations are permitted. There are also a number of military training routes (MTRs) leading to the UTTR airspace that allow military aircraft to approach the range at various altitudes.

The range is also equipped with a high-accuracy multiple-object tracking system (HAMOTS) capable of collecting real-time aircraft data on tests conducted at the UTTR.

The UTTR is currently operated and controlled from a mission control center (MCC) at Hill AFB. In addition to planning and managing tests, personnel in the MCC control the restricted airspace, much like the FAA controls unrestricted airspace. MCC personnel monitor all air traffic in the MOAs. Monitoring is accomplished by utilizing radar information from the FAA and using "gapfiller" radars to cover areas not covered by FAA radar.

Most aircraft that currently use the range fly in and out of Hill Air Force Base (AFB), although some use Michael AAF and others come from bases outside the region, using MTRs to get to the UTTR. Because the UTTR is so large, some of the operations and maintenance of the range are also based at Wendover, Michael AAF, and Oasis (a facility on the North Range of the UTTR).

In order to provide a complete capability for current and future electronic combat testing, the completed ECTC will consist of a number of facilities, including 100 threat sites where electronic equipment can be located and generated; a new MCC at Hill AFB; new maintenance facilities at a number of locations within the UTTR; additional aircraft operations; a fiber-optics communications network; and various additional support facilities. The UTTR's HAMOTS will also be expanded for the ECTC, and an additional gapfiller radar will be installed to extend radar coverage at low

altitudes in the southern part of the range to improve airspace safety.

The ECTC is proposed to be developed over a ten-year period starting in 1990 and reaching its target capability around the year 2000. The ECTC is expected to have an initial usable capability to begin testing in 1991. Thereafter, the capability and use of the ECTC will increase incrementally until it reaches its full capability.

2.1.2 THE ECTC ARENA

The ECTC arena is designed to simulate successive layers of an enemy's defenses ranging from the front line through various levels of tactical, second-echelon, and rear-area defensive zones to a simulated target deep within enemy territory. This arena covers a distance of about 80 miles. For reference, the various levels of defense zones are grouped into "tactical," "intermediate" (second-echelon), and "strategic" threat areas. However, the ECTC arena is more accurately characterized as a continuous defense system comprising scattered individual threat sites reflecting a concept known as "defense-in-depth."

The threat sites must be arranged to reflect the doctrine of defense-in-depth, which restricts their location and spacing. They must also provide adequate visibility of the immediately surrounding area, which requires them to be on fairly level, stable ground. They will not be placed on peaks, in mountainous areas, or located in depressions. Within the requirement for doctrinal realism, there is flexibility in locating individual sites to avoid construction problems or environmentally sensitive areas.

The ECTC arena will be used in a manner similar to the way the UTTR is currently used for testing and training. Aircraft participating

in an ECTC mission will take off from a staging or main operating base, fly through the arena in accordance with their mission plan, and return to their base.

In a typical ECTC test, the test aircraft, representing friendly or "blue" forces, will enter the test arena from the south, approach the threat areas, and descend to low altitude to avoid radar detection. After flying through an initial set of front-line tactical threats, the aircraft will remain at low altitude and proceed through intermediate radars and defense systems to a strategic threat area simulating the defense zone around a target that the test aircraft is trying to hit. Figure 2.1-2 presents a schematic of the low-level flying segment of a typical mission.

In addition to the ground-based threats, the test aircraft may encounter role-playing enemy or "red" airborne interceptors. Some tests will also involve aerial refueling and could include a number of support aircraft, such as airborne warning and control systems (AWACS), that provides radar surveillance and warning of enemy aircraft. A key objective of the ECTC is to evaluate how successfully combinations of "blue" systems work together. Figure 2.1-3 represents an entire typical mission scenario that is described above.

Since the ECTC primarily focuses on electronic "battles," a large number of systems transmit simultaneously in multiple frequency bands. Some test missions will also utilize countermeasures such as electronic jamming and releases of chaff and flares for deception.

Chaff and flares are dropped from aircraft to "confuse" electronic targeting systems and radars. Chaff are very small aluminum fibers

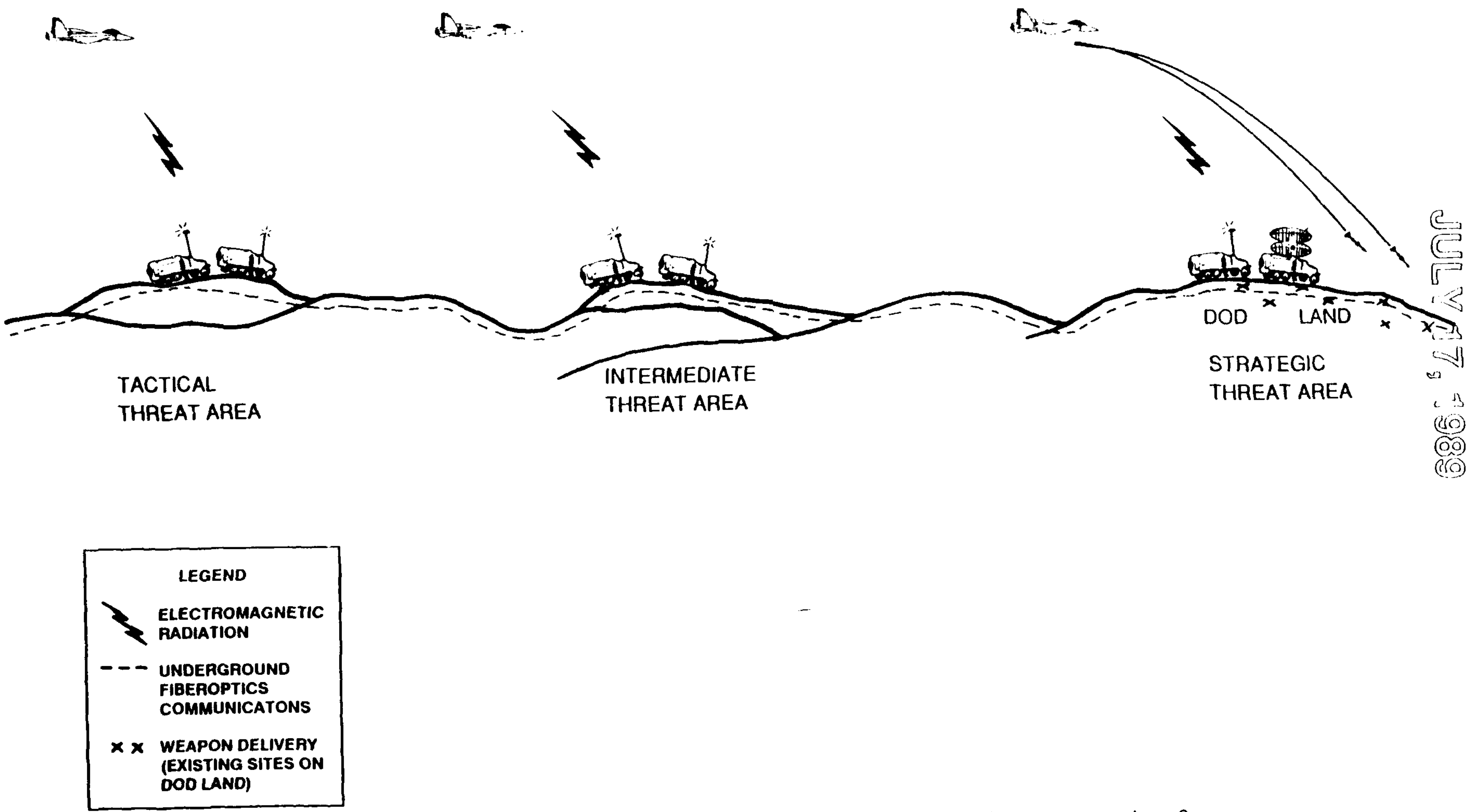

Figure 2.1-2. Schematic diagram of low-level flying segment of a typical ECTC mission.

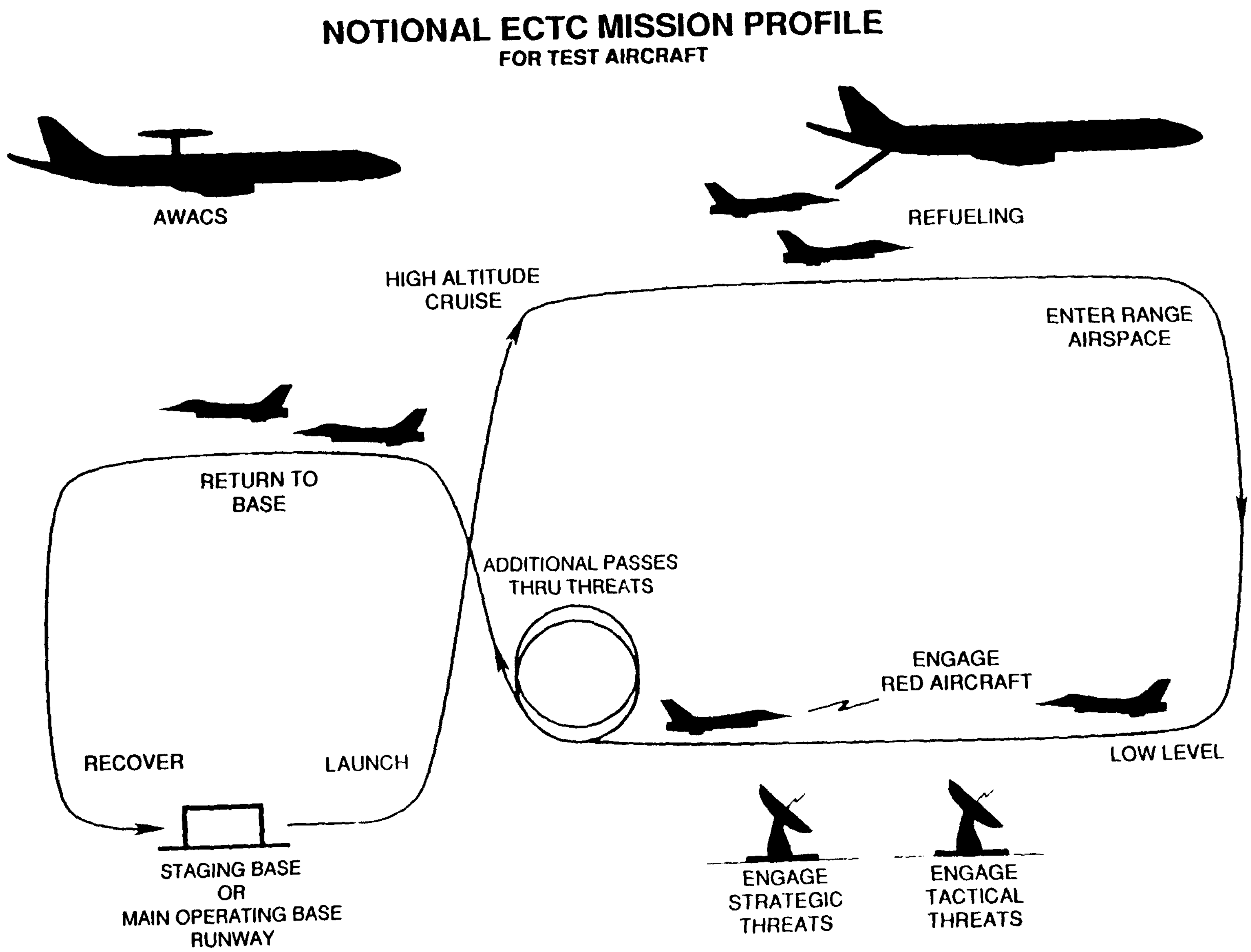

Figure 2.1-3. Typical ECTC mission scenario.

dropped in bu lles to obscure aircraft flying through radar. Flares are magnesium pellets used to avoid heat seeking guidance systems. These masking techniques could be used anywhere in the ECTC arena. Section 2.3.3.1 contains a full description of chaff and flares.

2.1.3 COMPONENTS OF THE ECTC

The basic components of the completed ECTC are:

1. One hundred threat sites, where manned threat systems (simulators) can be placed. Seventy of the proposed threat sites will be located in the tactical threat area (TTA), 10 in the intermediate threat area (ITA), and 20 in the strategic threat area (STA). The simulators will send out electronic signals of enemy radar systems, communications, passive detection systems, and jamming equipment. As the threat sites are constructed and integrated into the ECTC, they will be linked through a fiber-optic network to allow communications within the entire threat system array. Each site will have road access for placement of the mobile simulator and entry by maintenance personnel. All sites will eventually be equipped with electrical power.

2. Mission control functions, including the MCC and instruments on the range that collect and transmit information to the MCC. The existing HAMOTS and gapfiller radars support this function but each system requires expansion to encompass the entire ECTC arena. The HAMOTS relies on microwave transmissions.

3. Three range maintenance facilities, located on the range and that will provide operations and maintenance (O&M) support to the TTA, ITA, and STA.

4. Bases from which aircraft using the ECTC can take off and land or "stage." It is expected that a number of staging locations will be involved, including a primary base and one or two secondary bases. In addition, a number of the aircraft using the ECTC will stage from remote bases outside the region.

2.2 LOCATIONS FOR MAJOR PROJECT COMPONENTS

The UTTR and surrounding region was evaluated to identify the locations for ECTC program components. Specifically, alternative orientations and configurations of the ECTC arena on the UTTR were examined, and candidate locations for ECTC aircraft staging were identified. The locations of other components of the ECTC, including range maintenance and gapfiller radar sites, are dependent on the orientation and configuration of the ECTC arena. The major program facility locations under consideration are described in the following subsections.

2.2.1 ECTC ARENA CONFIGURATION

The threat arena selection process required choosing an overall orientation of the ECTC on the UTTR and, based on that orientation, selecting the best locations for the threat areas. These decisions were made by comparing each alternative against a number of criteria that were derived from operational considerations of establishing, operating, and maintaining the ECTC. As noted in Chapter 1, this Environmental Impact Statement (EIS) develops the environmental information required for decision-makers to make a final decision on the ECTC program and its configuration.

To determine the overall orientation of the ECTC on the UTTR, the criterion was established that no additional Department of Defense (DOD) withdrawn land or restricted airspace would be requested. Therefore, the orientation would have to fit within existing land and airspace boundaries.

A second set of criteria included the spatial arrangement and density of the threat sites so that a realistic battlefield arrangement could be achieved. These criteria consisted of a variety of elevations, flat areas, and separation requirements

between threat sites and threat areas, and the orientation between threat areas.

A third set of criteria considered ECTC operational characteristics that would allow almost unlimited low-level approaches to the tactical threat area (TTA); provide restricted air and ground space; minimize exposure of populated areas; and maximize the natural ability of high terrain to reduce radiofrequency interference (due to transmissions from the threat sites) outside of the arena.

The fourth set of criteria for selecting threat areas considered access to the sites for operations and maintenance, flexibility to accommodate any unknown future changes, security of the instrumentation, safety of the public, and compatibility with existing uses (both military and civilian).

Population centers, topography, and existing airspace restrictions prohibit satisfaction of ECTC airspace requirements via an east-west orientation on the North Range or the South Range of the UTTR. The north-south topographic trends in the South Range provide an operational match for airspace and ground space requirements.

Given the general north-south orientation of the ECTC on the South Range, numerous factors were considered to establish the location of the strategic threat areas (STA) and TTA. These included doctrinal realism, compatibility with other missions, airspace restrictions, and topography. Further, the STA must be at least partially located on DOD land, since ordnance will be used in conjunction with this area. Taking into consideration all these factors, the STA must be at the northern end of the South Range, and the TTA must be in the southern section of the range. With the general locations of the STA and TTA specified, the intermediate

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threat area (ITA) would be placed between them to simulate the second-echelon defense zone.

Three valleys within the South Range were found to have a suitable configuration for the ECTC arena and were identified as candidates for the potential TTA locations. These are Tule, Snake, and Whirlwind valleys. These valleys are illustrated in Figure 2.2-1. Due to the delivery of ordnance and other physical constraints of the terrain in the northern section of the South Range, all three configurations will use the same STA and ITA locations.

2.2.2 STAGING BASE NARROWING PROCESS

The narrowing process for identifying the operational staging base alternatives consisted of the following four main steps:

1. Identify the region for staging options.

2. Apply exclusionary criteria to eliminate unsuitable areas from consideration as a local staging base.

3. Apply selection criteria to identify candidate staging locations.

4. Develop specific staging alternatives by defining the operations at each staging location with respect to the distribution of aircraft operations, facility requirements, and personnel assignments.

The definition of a suitable region for staging operations was based on operational effectiveness. The criteria addressed separation of test-team participants and accessibility to the range

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UTAH TEST AND TRAINING RANGE (UTTR)

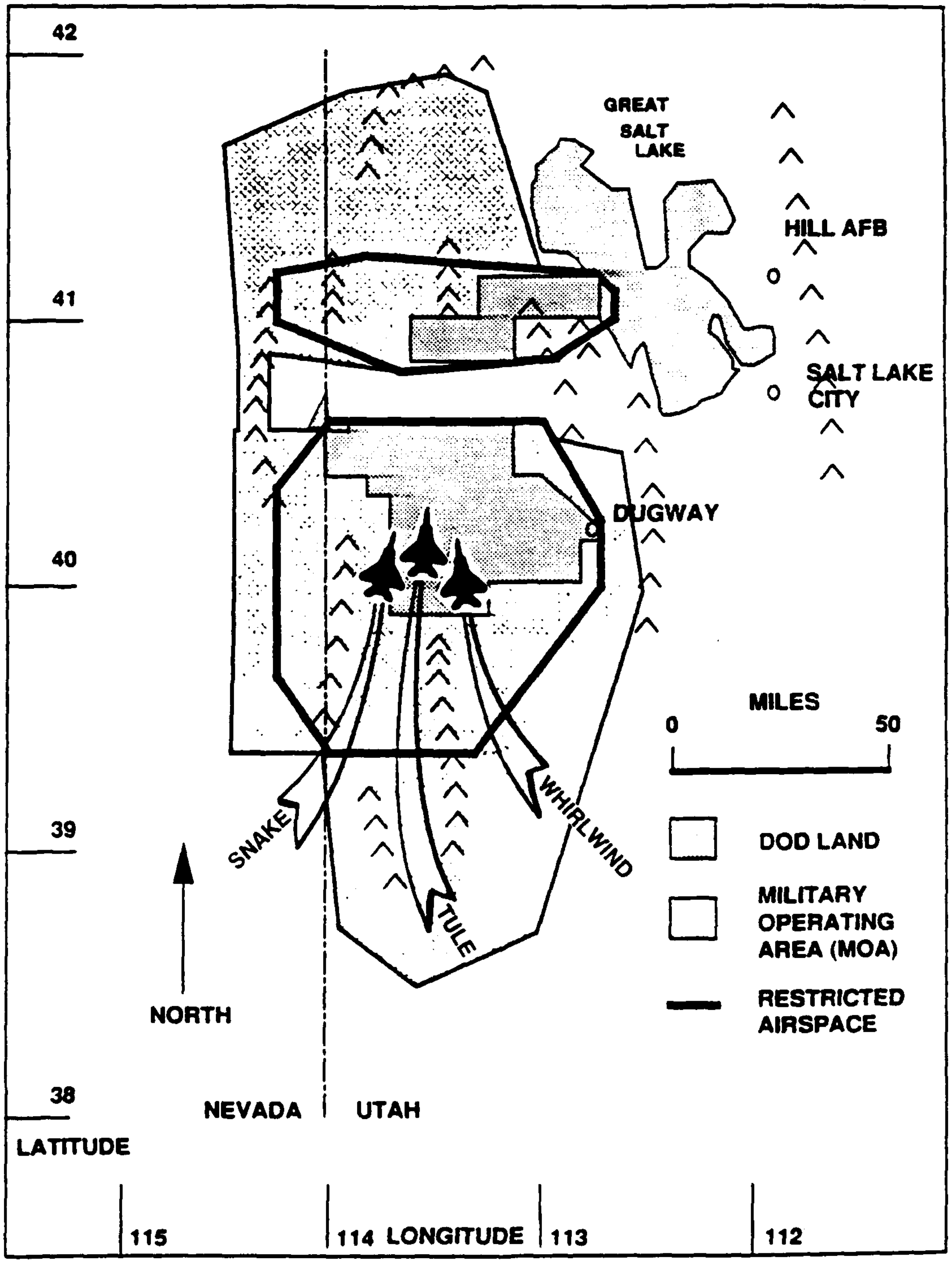

Figure 2.2-1. Overview of flight paths through valleys.

itself. Areas over three hours driving time from Hill AFB and 85 miles from the ECTC range were excluded.

The exclusionary criteria used to narrow the geographical regions having the potential to meet minimum ECTC operational and mission requirements for a local staging base focused on two additional primary issues:

1. Operational and developmental suitability for ECTC test operations, construction of test-operations support facilities, and potential for conflicts with other DOD missions in the area.

2. Environmental conflicts that resulted in the exclusion of known environmentally sensitive areas, such as National Wildlife Refuges and wetlands.

After applying the exclusionary criteria, the following selection criteria were employed to select staging alternatives:

1. Airfield Suitability. Space requirements, orientation, weather conditions, and flight safety were considered.

2. Mission Compatibility. Staging-base locations that would degrade other DOD missions were unacceptable.

3. Encroachment. Areas experiencing major population growth and development were avoided in order to decrease the potential for encroachment by incompatible development.

4. Land Ownership Patterns. Land in candidate locations should provide a sufficient area of land for a staging base without having to assemble and acquire a large number of small parcels from many land owners.

5. Current Land Use. Only areas that are existing airfields (military or civilian) or that are currently used for military purposes were considered as candidate staging-base locations.

Locations that were identified after application of the selection criteria are shown in Figure 2.2-2. Potential locations include Hill Air Force Base (AFB), Salt Lake City International Airport (SLC), Wendover, Delta, Fillmore, and Michael Army Airfield (AAF).

Operational staging for the proposed ECTC requires a variety of support facilities for aircraft and personnel. These requirements must be met by a combination of locations or staging alternatives from the candidates previously identified that include a primary base and a number of secondary locations. All alternatives assume that some aircraft would stage from Michael AAF and that the field would be used for emergency recoveries. Similarly, it was assumed that some aircraft would be staged out of Hill AFB for operational or logistics support reasons and that Hill would be used for aircraft maintenance. In addition, it was assumed that there will always be a number of flights that originate from and return to bases outside the UTTR area. These bases are collectively referred to as remote staging. Based on these assumptions, seven staging alternatives have been developed:

1. Hill AFB as the primary staging location, with Michael AAF and remote bases as secondary locations.

2. Primary staging at Michael AAF and secondary staging from Hill AFB and remote bases.

3. Primary staging at SLC Airport, with secondary staging from Hill AFB, Michael AAF, and remote bases.

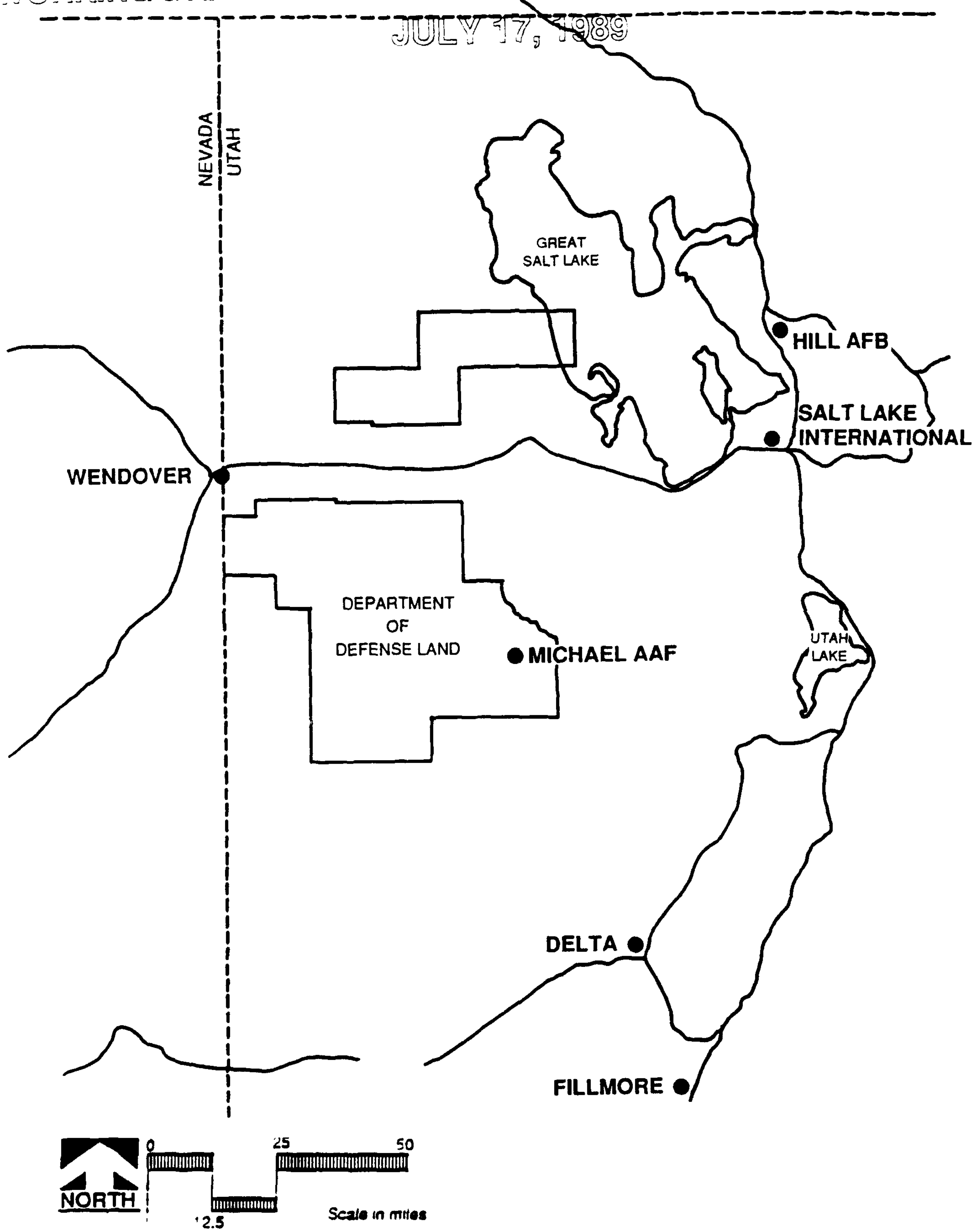

Figure 2.2-2. Selected staging-base alternatives.

4. Primary staging at Wendover, with secondary staging from Hill AFB, Michael AAF, and remote bases.

5. Primary staging at Delta, with secondary staging from Hill AFB, Michael AAF, and remote bases.

6. Primary staging at Fillmore, with secondary staging from Hill AFB, Michael AAF, and remote bases.

7. Primary staging at remote bases, with secondary staging from Hill AFB and Michael AAF.

2.3 PROPOSED ACTION

The proposed action is to develop the ECTC in the South Range of the UTTR with support from Hill Air Force Base (AFB) as the primary staging base, range maintenance facilities at Wendover and Sand Pass, and Michael Army Airfield (AAF) as the secondary staging base. Additional maintenance personnel will also be added to the existing facilities in the vicinity of Michael AAF. The proposed land-based location of the ECTC arena stretches in a north-south orientation from the northern end of the South Range southward through Tule Valley.

2.3.1 DESCRIPTION OF THE PROPOSED VALLEY

Tule Valley is oriented north-south and is approximately 17 miles wide by 40 miles long. The valley contains no communities or ranches and is bounded to the west by the Confusion Range and to the east by the Fish Springs and House ranges. The central region of the valley floor is broken by Chalk Knolls to the south, Coyote Knolls in the middle, and the Middle Range to the north.

Tule Valley offers excellent terrain for deploying a realistic arrangement of ground threats to form the tactical threat area (TTA). The valley has generally flat terrain on the east side and sloping, hilly features on the west. Coyote and Chalk knolls provide excellent terrain masking for aircraft entering the valley. The Middle Range provides areas of high ground on which to locate the TTA. With the northern edge of the TTA located within the Middle Range, there are approximately 60 miles between the TTA and the strategic threat areas (STAs) to the north.

This valley is particularly well-suited to support realistic operations of the ECTC. Low-level ingress from the south passes over unpopulated areas and few major roads with the exception of

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U.S. Highway 50, which must be overflown to gain entrance to any of the three valley alternatives. Half of the valley lies under restricted airspace and the other half under a military operations area (MOA). Tule Valley offers sufficient room and protection for the scale of air battles envisioned for the ECTC.

Primary ground access to Tule Valley is by an all-weather county road that enters the northern end of the valley via Sand Pass. Other roads that run through the valley are passable, but will require upgrading and maintenance to provide year-round access to the TTA sites. Since population density in Tule Valley is zero, commercial power is not currently available.

2.3.2 CONSTRUCTION ACTIVITIES

2.3.2.1 <u>Threat area and sites</u>

One hundred threat sites will be constructed in the ECTC arena. In total, 70 tactical threat sites will be constructed in Tule Valley on public land that is managed by the Bureau of Land Management (BLM). Ten intermediate threat sites will be constructed on DOD land along Goodyear Road, which runs east-west across the southern section of DOD land. Twenty strategic threat sites will be constructed, ten on DOD land west of Wildcat Mountain and ten on public lands west of Cedar Mountain that are managed by the BLM. Although the tactical threat site locations are dependent upon the valley selected for the ECTC arena, the locations of the intermediate and strategic threat sites remain the same for all three valley alternatives.

Nominal locations for each of the 100 threat sites have been identified based on doctrinal layout parameters. Only the locations of the first 13 sites [initial operating capability (IOC) sites] in the TTA have been precisely defined and scheduled to be

constructed in 1990 (Figure 2.3-1). The remainder of the sites are representational only, with some variation possible during design due to environmental or operational considerations. Figure 2.3-2 represents a notional layout of the complete network of 70 tactical threat sites with connecting roads and other support requirements. Figure 2.3-3 represents the 10 intermediate and 20 strategic threat sites.

A typical threat site will consist of an area measuring approximately 100 to 150 ft by 100 to 150 ft. For analysis purposes, an area consisting of one 150 ft by 150 ft threat site plus a turnaround area (together equaling 0.6 acres) is used. The area will include three pads on which instrumentation trailers, maintenance trailers, and electronic threat systems can be placed. Power and fiber-optics hookups will also be included on each site. One of the pads within the site will be concrete, and the others will be stabilized earth. Transportable simulated electronic threat systems will be brought in and "parked" on the concrete pad. The threat systems will be "plugged in" to the power and fiber-optics hookups for operational use. A livestock fence will surround the site. Figure 2.3-4 graphically represents a typical threat site. When the ECTC reaches its projected capability, approximately 75 percent of all sites will be occupied with threat systems at any one time.

2.3.2.2 <u>Range maintenance facility</u>

Range maintenance facilities (RMFs) will be required for operating and maintaining the threat systems and threat sites. In addition, range security will be provided from the RMFs. The RMF for the proposed TTA will be at Sand Pass (Figure 2.3-2). It will consist of a maintenance facility, a helicopter hangar and apron, and administration, security, vehicle maintenance, and emergency

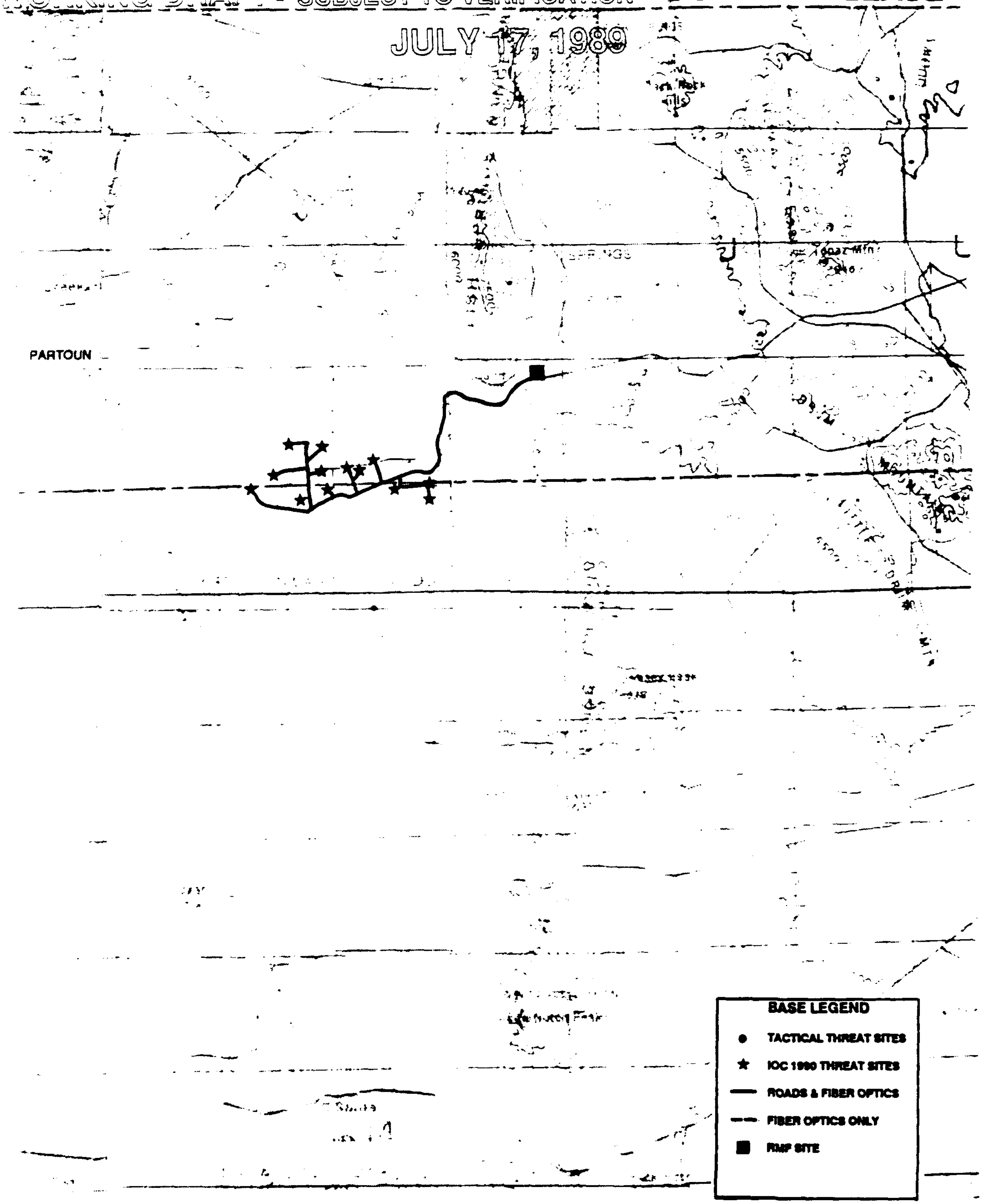

Figure 2.3-1. Tule Valley initial operating capability (IOC) tactical threat sites for 1990 construction.

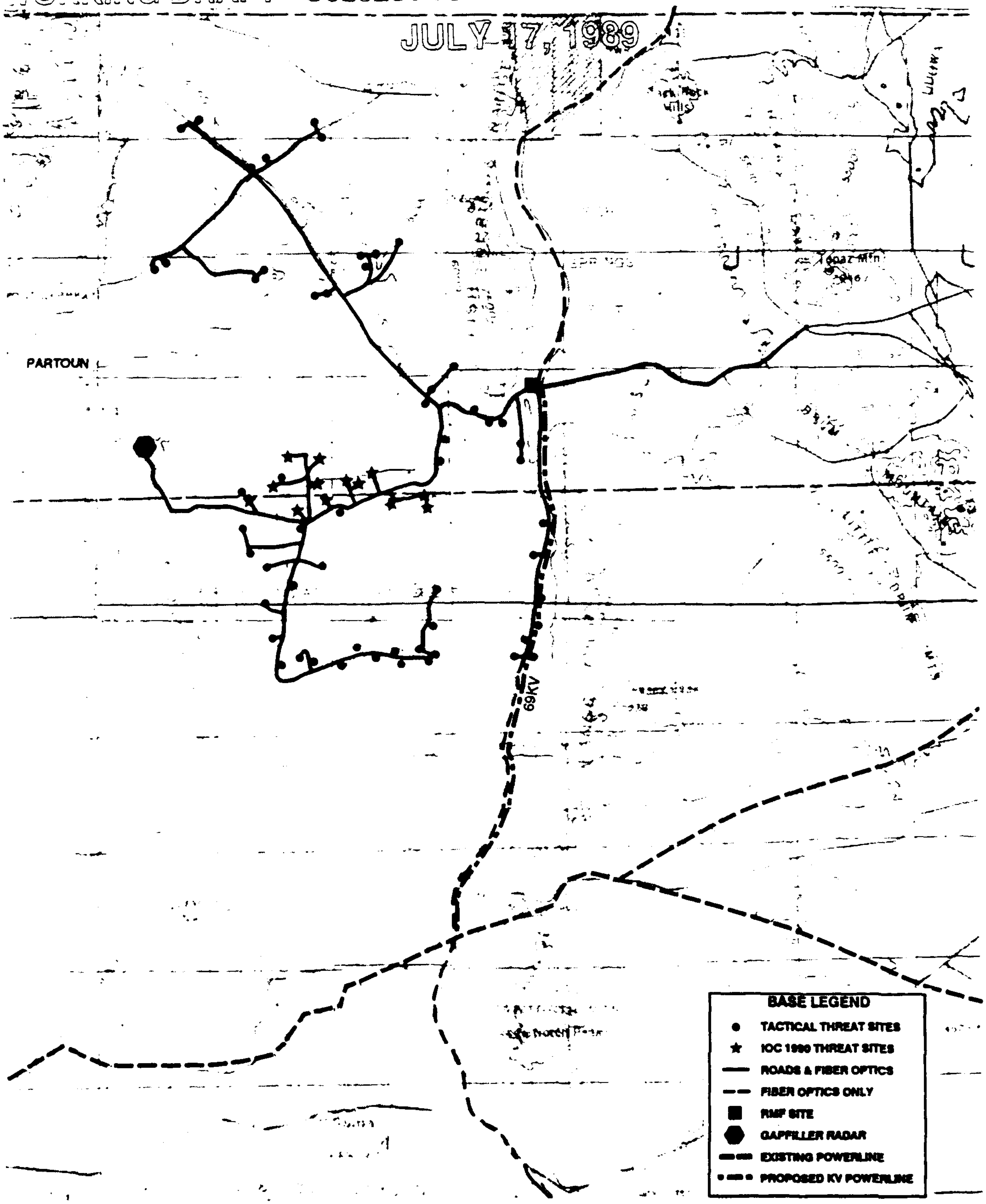

Figure 2.3-2. Tule Valley tactical threat area, road network and support facilities.

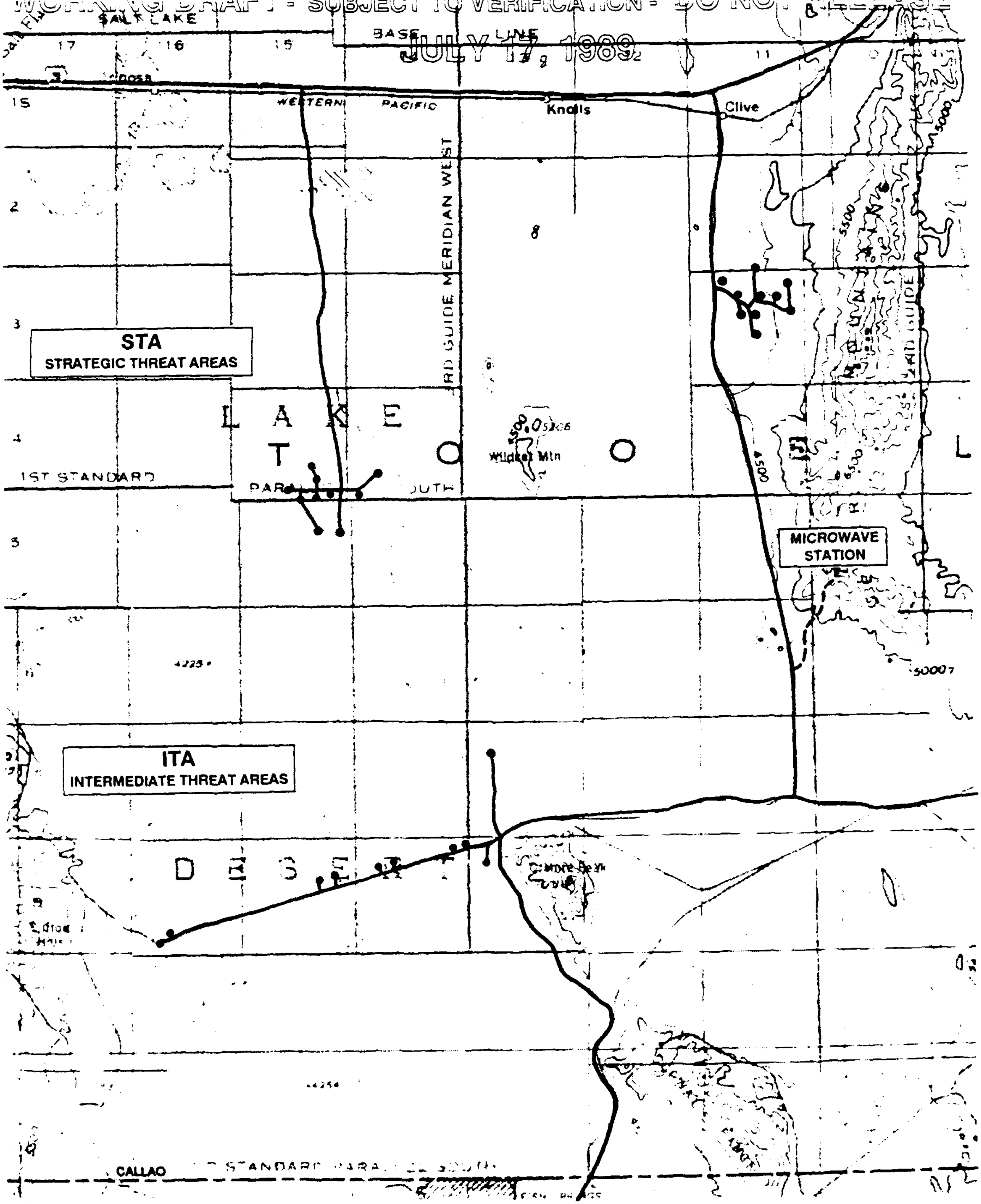

Figure 2.3-3. Intermediate and strategic threat areas (ITA and STA), respectively and associated threat sites.

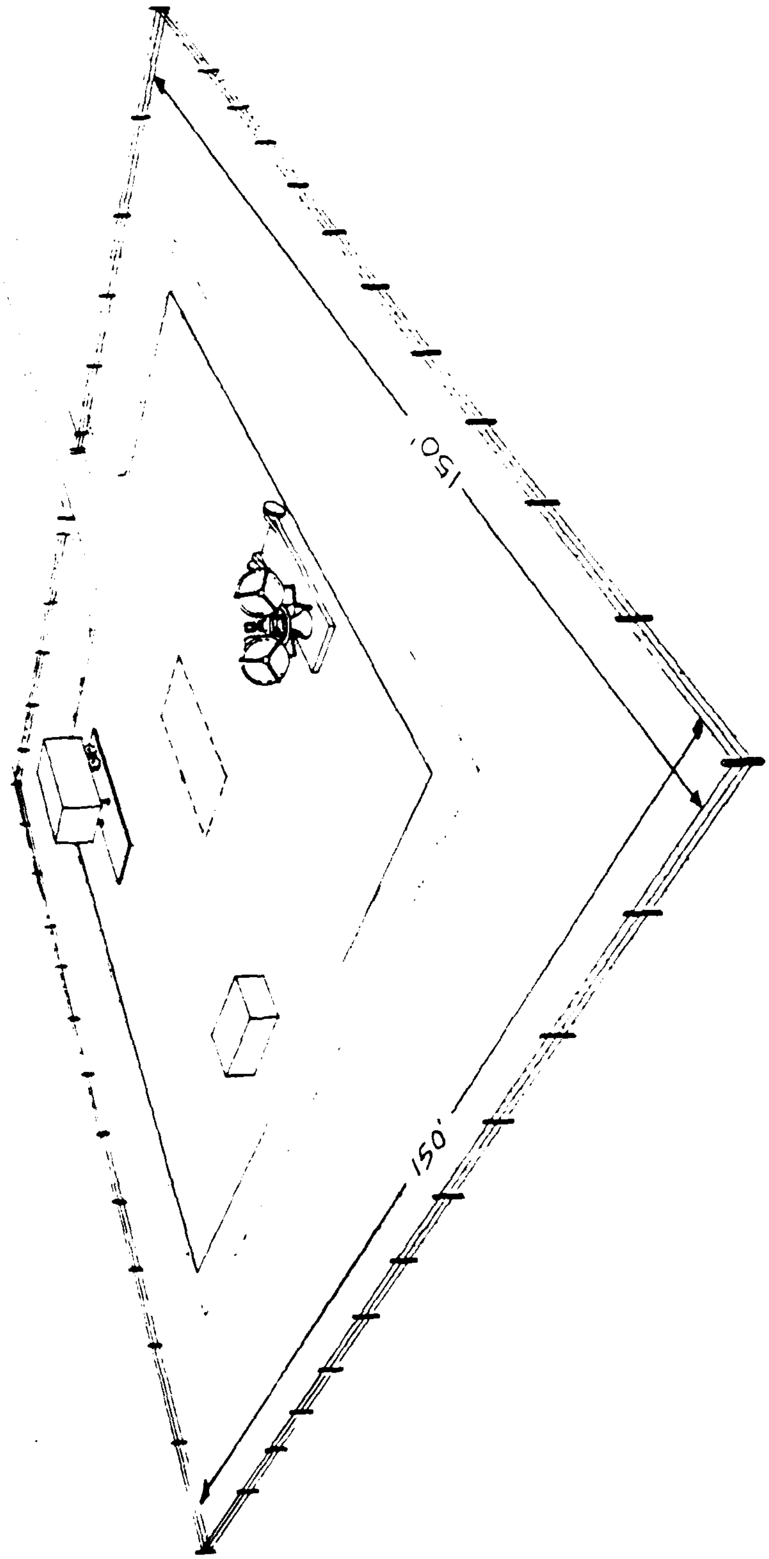

Figure 2.3-4. Typical threat site.

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response facilities. Crew quarters for the security and alert forces will be included. Figure 2.3-5 represents a layout of the RMF at Sand Pass. Construction is scheduled to begin in 1992 and will be completed in 1994. Until the RMF is operational, operations and maintenance (O&M) will be housed in trailers at the Sand Pass site.

Potable water will eventually be provided by a deep well and water treatment facility at the Sand Pass RMF. Domestic wastewater would be handled by septic tanks and leaching fields as follows:

1. For crew quarters two 750 gallon septic tanks and a 12,500 sq ft leaching field.

2. For the administrative area, one 5,000 gallon septic tank and a 500 sq ft leaching field.

3. For the helicopter hanger area one 500 gallon septic tank and a 1,600 sq ft leaching field.

Industrial waste (solvents, battery acids, etc.) will be stored temporarily and transported to Hill AFB for disposal.

The water needs of the operators at the threat sites will be met by hauling water from the Sand Pass RMF to the threat sites. Domestic waste at the individual threat sites will be handled by chemical toilets. Industrial wastes will not be generated at the threat sites.

Range maintenance for the intermediate threat area (ITA) will be provided from existing facilities at Michael AAF and at Wendover, Nevada for the STA. No additional maintenance facilities are planned for Michael AAF. Additional facilities required at

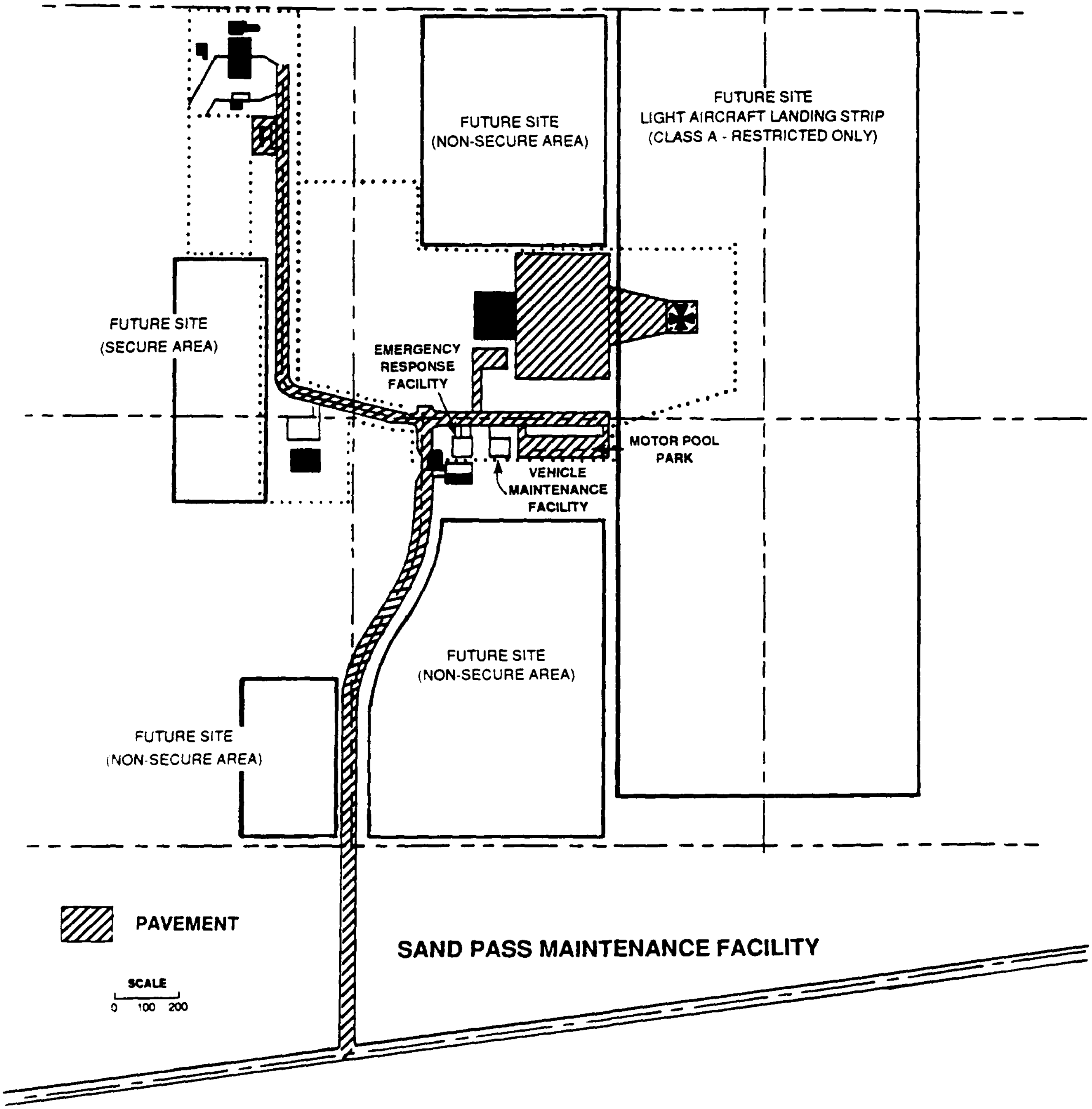

Figure 2.3-5. Layout of the range maintenance facility at Sand Pass.

Wendover include a maintenance shop, a helicopter hanger, and supporting infrastructure. Construction will occur between 1993 and 1995.

2.3.2.3 Gapfiller Radar

A gapfiller radar unit will be installed off-range at Frisco Peak (Figure 2.3-6) in 1992 to facilitate air traffic control and ensure safe separation of all aircraft in the vicinity of the ECTC arena. This facility will consist of standard AN/ASR-9 Federal Aviation Administration air traffic control radar that will initially be linked to the mission control center (MCC) by microwave and ultimately by fiber-optics lines. Frisco Peak has existing access roads and power. The fiber-optics connection to the gapfiller radar will require a ground-disturbance zone primarily along existing roads that will be approximately 10 ft wide and 42 miles long (Figure 2.3-6) from the southernmost threat site.

2.3.2.4 Fiber-optics network

All threat sites will be linked together by a network of fiber-optics lines. The fiber-optics network will extend from the MCC at Hill AFB to all RMFs and to the gapfiller radar site. From the RMFs, the network will be extended to the threat sites. Figure 2.3-7 presents an overview of the network. This network will be constructed over a period of years (1990-1996). Where possible, the network will follow existing or proposed new roads to minimize ground disturbance. The fiber-optics network will be buried approximately 4 ft underground by a trenching machine which will disturb an area approximately 10 ft in width.

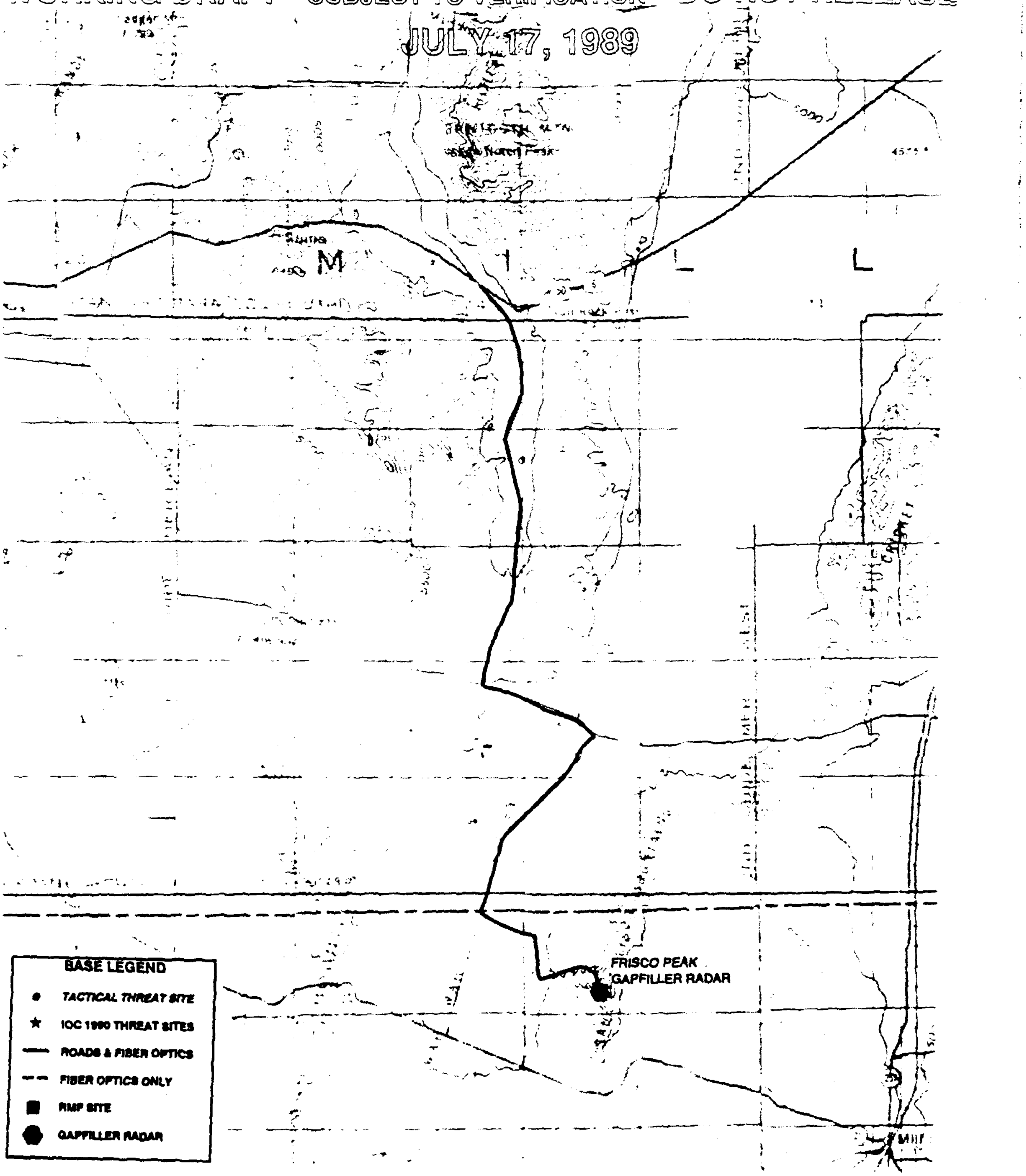

Figure 2.3-6. Tule and Whirlwind valleys gapfiller radar site, road, and fiber-optics lines.

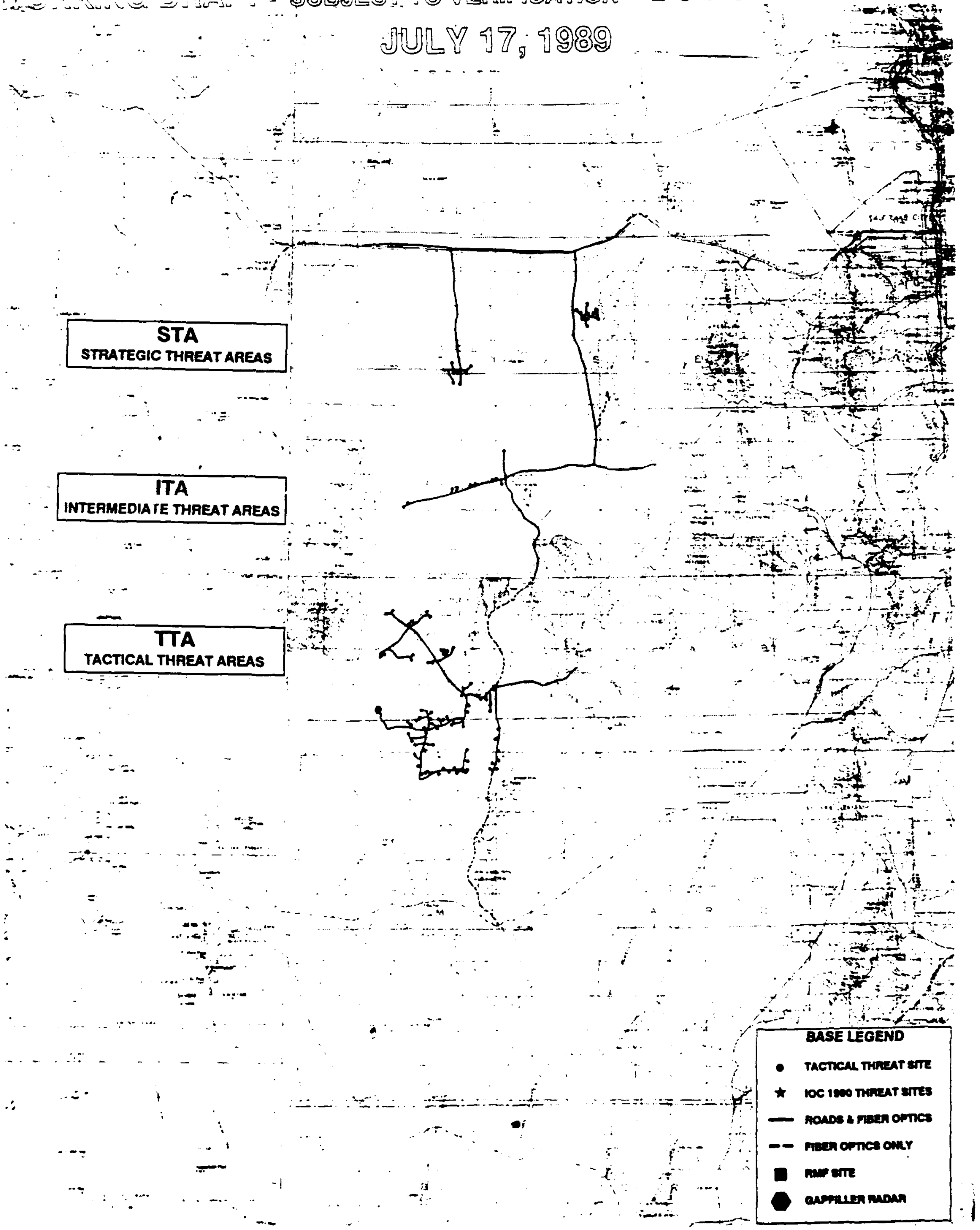

Figure 2.3-7. Overview of Tule Valley fiber-optics network.

2.3.2.5 Road requirements

Roads are required for movement of the threat systems to and from the threat sites and for access by range O&M personnel. Threat site locations attempt to maximize use of existing roads and vehicle trails. When necessary, main access roads will be widened to 22 ft and graveled. The average disturbance width will not exceed 50 ft. The existing main roads have an average disturbed zone width of 40 ft. The fiber-optics lines will be trenched next to the roads, where possible, to remain within the extent of ground disturbance of 50 ft in width.

Approximately 196 miles of existing roads will require upgrading to main access roads for the ECTC. Secondary roads (spurs) will lead from the main access roads to individual threat sites. These will also be gravel, 15 ft wide, and have a disturbance zone 33 ft wide for construction activity and trenching of the fiber optics. Currently, these roads disturb a width of approximately 24 ft. Approximately 116 miles of gravel spur roads will be upgraded, including 78 miles for access to the gapfiller radar site. One hundred additional miles of new spur roads will be constructed. Most of the new gravel spur roads will be constructed over jeep trails, increasing the disturbed zone from approximately 8 to 33 ft. The only road planned to be paved is the existing dirt road from Sand Pass eastward to Route 272, a distance of approximately 15 miles.

2.3.2.6 Power Requirements

Initially, the threat sites will be powered by diesel generators located on site. The threat sites will eventually be placed on a power grid and electric power will be brought to the RMF via an overhead 69,000 volt (69 Kv) line from an existing power line approximately 29 miles south of Sand Pass. This will require a

switch station at the junction of the two lines and a substation at the RMF. A right-of-way of 30 ft will be required for the transmission line. Power to the threat sites will be via aboveground transmission lines up to about two miles from each threat site and then underground to the sites. The power poles will be 35 ft high. The line will be designed to prevent the electrocution of birds.

2.3.2.7 High-accuracy multiple-objective tracking system (HAMOTS)

There is an existing high-accuracy multiple-objective tracking system (HAMOTS) in place on the South Range. This system transmits information to aircraft and Hill AFB by microwave. The individual sites are called range integration data relay units, commonly referred to as micro-A stations. Fifty of these stations will be installed to supplement the existing system. These are self-contained solar power units that are placed and maintained via helicopter or truck. Figure 2.3-8 presents a schematic view of a micro-A station.

2.3.2.8 Security requirements

The threat systems within the ECTC arena sites are valuable, sensitive pieces of equipment. Approximately seven computer-controlled television cameras mounted on wooden poles will be placed at various road junctions on the range for security purposes. Intrusion detection devices at each of the threat sites will be used to enhance the security of the equipment. The detection devices will be monitored at the Sand Pass RMF by annunciator and screens. The security equipment will utilize fiber optics for transmission of the data.

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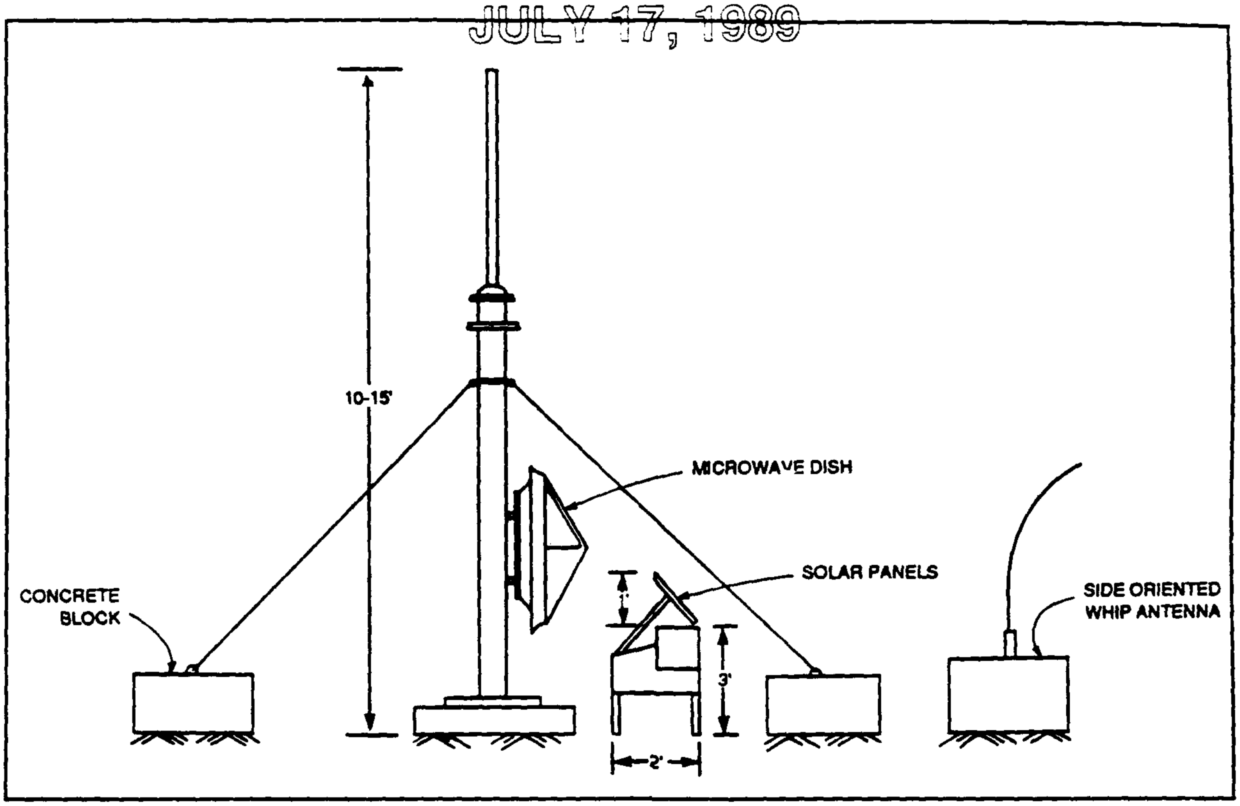
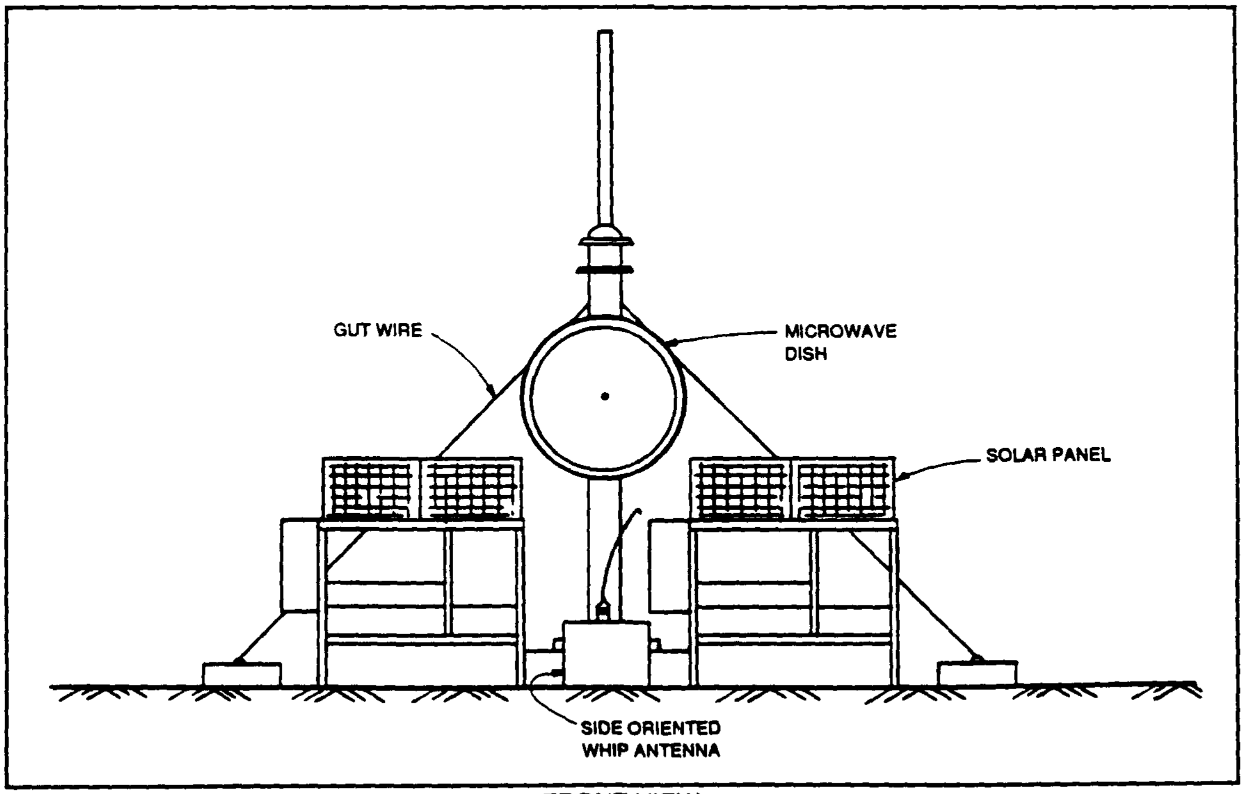


SIDE VIEW



FRONT VIEW

Figure 2.3-8. Schematic view of a range integration data relay unit (micro-A station).

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2.3.2.9 Mission control center (MCC)

A new MCC will be constructed at Hill AFB. It will be a consolidated facility that will house existing range control functions and provide mission control for the entire UTTR, including the ECTC and other missions. Adjacent to the new MCC will be an engineering and technical services support facility for contractor personnel supporting UTTR mission control functions. Figure 2.3-8. Schematic view of a range integration data relay unit (micro-A station).

Two additional facilities will be constructed at the base to house an Air Force Operation Test Evaluation Center (AFOTEC) detachment and government engineering and support personnel.

2.3.2.10 Staging bases

In addition to the facilities previously described, new facilities may be required to support ECTC aircraft staging. The proposed action involves primary staging from Hill AFB and secondary staging from Michael AAF. By the year 2000, about 25 percent of the aircraft that use the ECTC will not stage locally but will come from remote bases outside the UTTR region.

Facilities anticipated to be constructed at Hill AFB to support ECTC staging include two aircraft hangars and aprons, an electromagnetic chamber, a helicopter hangar, a fueling area, covered storage area for equipment, vehicle parking, fencing, and security lighting. Supporting utilities and roads will be extended from existing base services. Additional billeting and mess facilities may be required as well. All facilities will be located on existing base land.

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Additional facilities may be needed at Michael AAF, including an aircraft hangar and apron, munitions storage and loading area, and parking. Improvement may also be required to the existing runway and navigational system.

2.3.2.11 Schedule, resource requirements, and personnel

Construction for the ECTC projects will consist of the following phases:

1. Construction of an initial set of 13 threat sites in 1990, allowing ECTC testing to begin in 1991.

2. Construction of a mission control center at Hill AFB from 1991 to 1992.

3. Construction of the remainder of the threat sites (57) with attendant roads, power lines, and fiber optics between 1991 and 1996.

4. Construction of a gapfiller radar in 1992.

5. Construction of TTA range maintenance facilities at Sand Pass and STA-associated range maintenance facilities at Wendover from 1992 through 1995.

6. Construction of aircraft staging support facilities at Hill AFB starting in 1993 and continuing through 1998.

7. Construction of aircraft staging support facilities at Michael AAF starting in 1996 and continuing through 1998.

Within the same time frame, security devices will be installed in the Tule Valley (television monitoring, alarms, fences, etc),

fiber-optics trunk lines will be installed, and power transmission lines and substations will be constructed for the project. Approximately 1,420,000 tons of aggregate and a maximum of 3,900 acre-feet of water (peak water use during 1996-1997) will be needed for construction and improvement to existing facilities for the proposed action.

The timing of the major phases of construction are illustrated in Figure 2.3-9. This construction schedule is tentative and subject to change due to revised-program decisions and/or funding.

Table 2.3-1 summarizes the construction work force, expressed as full-time equivalent (FTE) personnel (e.g., 1 man working 1 full year or 12 men working 1 full month), required for the major construction activities associated with the TTA, ITA, STA, RMFs, and gapfiller radar sites. Table 2.3-2 summarizes direct construction employment related to the staging bases for the proposed action.

2.3.3 OPERATIONS

2.3.3.1 Flight activities

The facilities and infrastructure improvements proposed for the ECTC will establish an arena where electronic combat testing may be effectively conducted. Various DOD organizations will comprise the actual users of the ECTC, with individual programs being scheduled on the range. The specific requirements of individual programs may vary, but the missions will be similar.

During a test or exercise, simulators will be brought to the threat sites and installed. Most of the threat systems will be manned,

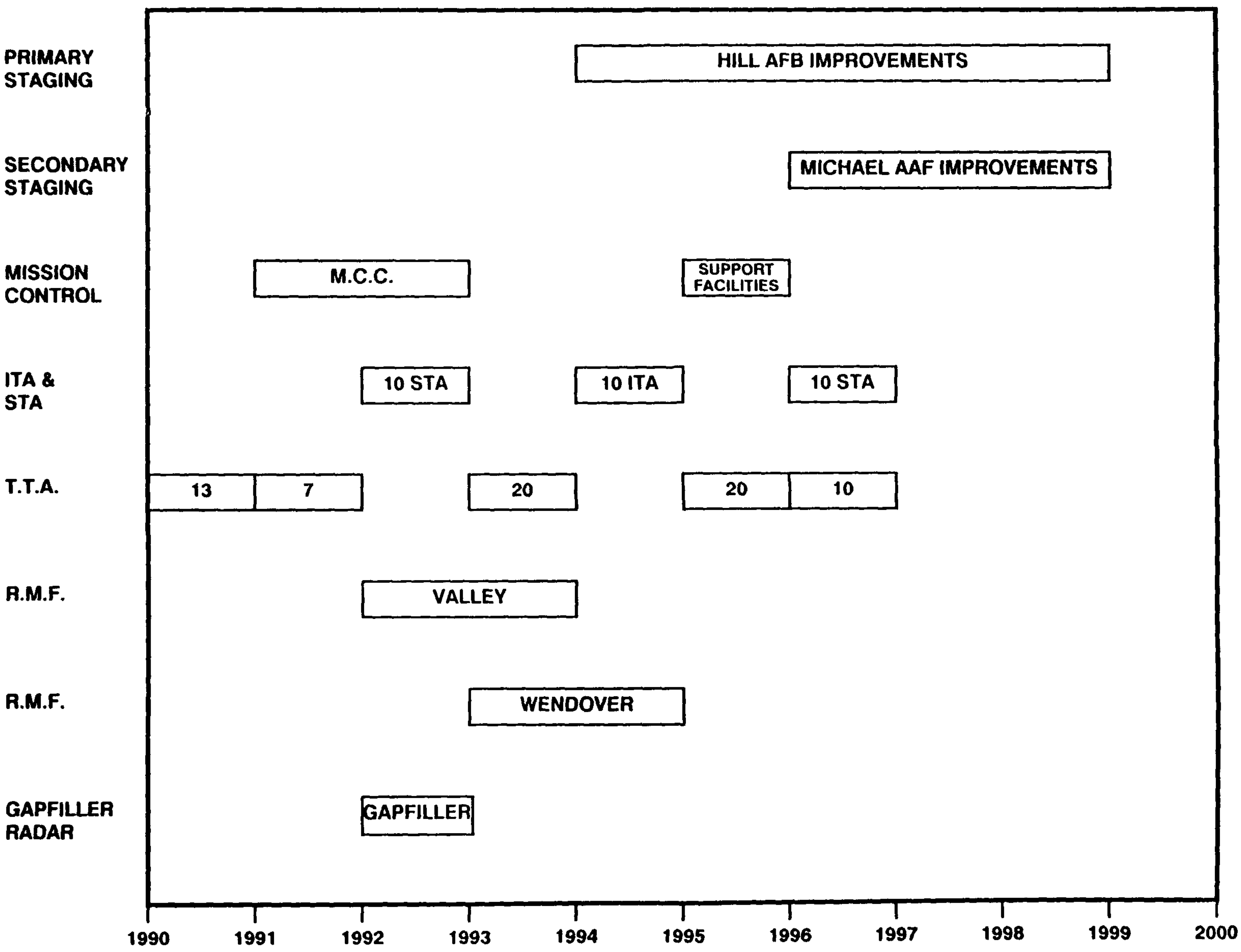

Figure 2.3-9. ECTC construction schedule.

Table 2.3-1. Tactical, intermediate, and strategic threat areas construction work force.

	FTE Construction Personnel										
	1990	1999	1992	1993	1994	1995	1996	1997	1998	1999	2000
RMF (Wendover)	0	0	0	4	18	16	0	0	0	0	0
RMF (Sand Pass)	0	0	3	18	10	0	0	0	0	0	0
Threat Sites	19	9	19	35	41	41	41	0	0	0	0
Gapfiller	0	0	2	0	0	0	0	0	0	0	0

Table 2.3-2. FTE construction personnel related to staging for the proposed action.

Location	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Hill AFB	0	17	79	35	23	86	85	31	11	0	0
Michael AA	0	0	0	0	0	0	17	70	52	0	0

and ECTC tests and exercises will involve operators on the ground as well as in the aircraft. The spatial distribution of flights is shown in Figure 2.3-10.

Military aircraft operations in the South Range are projected to increase 11 percent without ECTC. With ECTC sorties, this increase is projected at 54 percent by the year 2000. This reflects a gradual increase to a total of approximately 38,000 projected sorties in 2000. Current operations are distributed nearly equally between the high altitude [10,000 ft above mean sea level (MSL) and above] and low altitude (below 10,000 ft above MSL) sectors. Future non-ECTC operations can be expected to follow the same trend. ECTC operations would be predominantly in the low sectors, with approximately 86 percent of the sorties flying low-altitude flight profiles through the Sevier MOAs and the threat and target areas. The remaining ECTC sorties would conduct aerial refueling, airborne command and control missions, and would normally operate above 18,000 ft. The four military training routes (MTRs) entering the South Range from the south are currently flown by an average of 60 sorties per month. Ten percent of the ECTC missions are expected to approach the project area on these routes. Monthly usage would double to 120 sorties by the year 2000.

Some missions will be conducted at night, both to accommodate the workload and to test night operations. Other types of missions conducted at night are those that need to use broadcast frequencies that conflict with other communications. The Federal Communications Commission (FCC) and the Federal Aviation Administration (FAA) may require that these tests be conducted at times (such as very early in the morning) when they will not pose interference problems. Eventually, as many as 50 percent of the ECTC missions may be conducted at night, with 30 percent of the missions occurring during the noise sensitive period from 10:00 P.M. to 7:00 A.M.

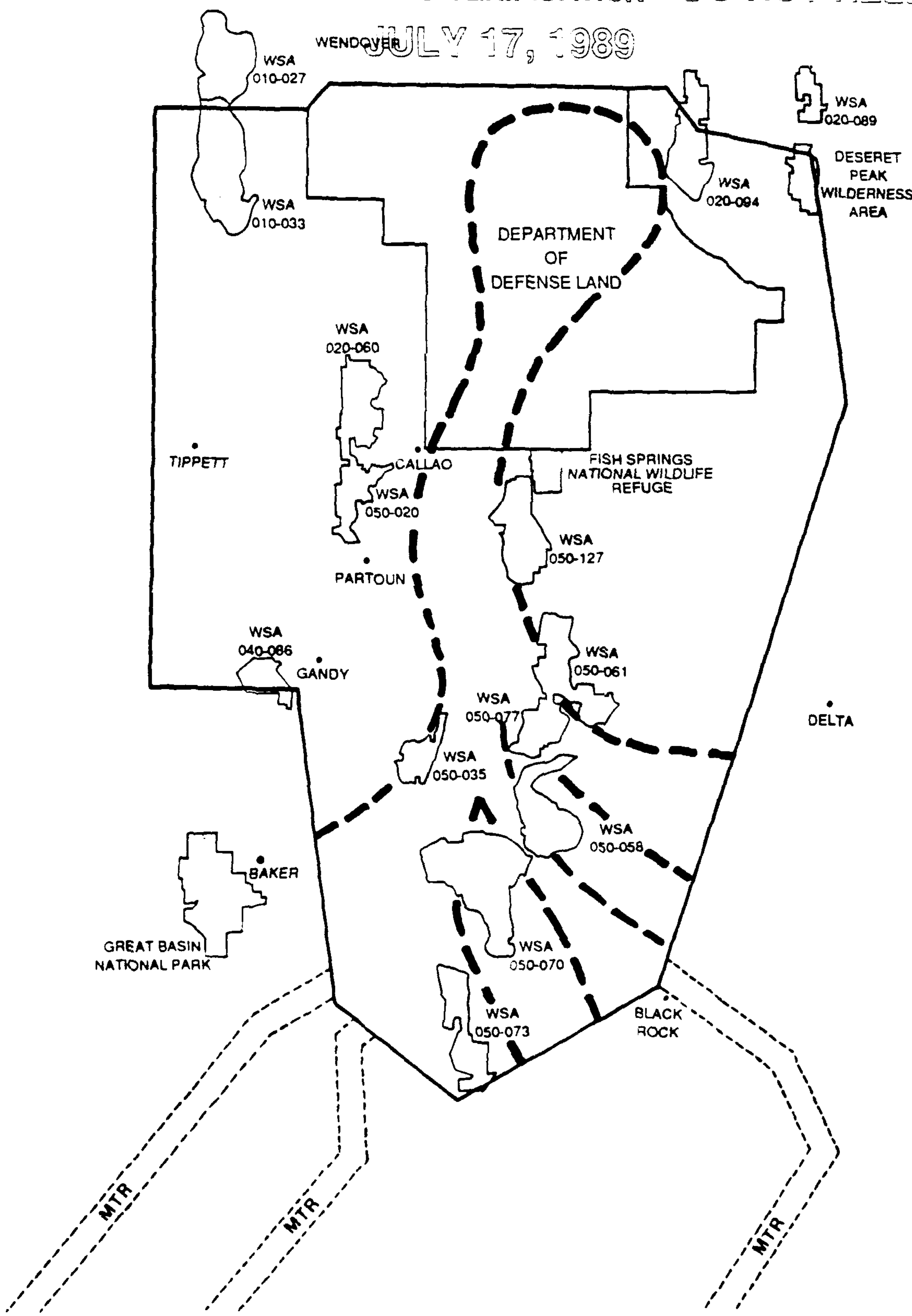

Figure 2.3-10. Spatial distribution of ECTC flights in Tule Valley.

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Most missions will involve use of chaff and flares. As defensive mechanisms for aircraft penetrating the ECTC arena, these mechanisms are typically used at altitudes well above the low-level altitude entry in the TTA area. Chaff are typically 1 to 1-1/2 inch long fibers with a diameter of 0.003 inches of type E class microfilament coated with aluminum of 99.0 percent purity with a second coating of stearic acid to aid dispersal. When bundles of chaff (a single bundle is 1"x1"x7") are released from an aircraft, they show up as a cloud on radar screens obscuring the aircraft so that it cannot be targeted. Flares are released from aircraft to confuse heat-seeking guidance systems. These flares are made of plastic and metal and weigh from one to three ounces. Flares consist of magnesium pellets attached to a bracket that is ignited when it is discharged from the aircraft. They are dropped at altitudes above 1500 feet AGL and burn out while they are in the air, posing a very low risk of fire. By the year 2000, approximately 450 cubic feet of chaff and 14,500 flares will be dropped over a 1,400 square mile area that encompasses all threat areas. In addition to the chaff and flares, lasers will be used by some aircraft during ECTC missions. Use of lasers that are not eye-safe will be confined to existing DOD land where laser targets are already located and currently used.

As stated, the purpose of the ECTC is to test electronic systems. ECTC missions will not, therefore, involve the release or firing of ordnance, with the exception of target missions such as those around the STAs. Approximately 20 percent of these STA-related missions will carry ordnance and 80 percent of the ordnance will be inert. Inert ordnance does contain a small "spotting" charge. All ordnance use, whether inert or occasional live drops, will be confined to approved areas of DOD land where such activities currently occur.

There will also be some unmanned aircraft flights associated with this program. These are small subsonic air vehicles that carry electronic packages designed to divert threats from the test aircraft, or to gather intelligence on threats or jam threats.

There will be some supersonic flight associated with the ECTC, but additional supersonic airspace is not required. Since supersonic flight outside the existing supersonic operating area (SOA) may become a requirement in the future, this EIS will consider such operations. By doing so, the public and decision makers will be knowledgeable of impacts associated with the proposed activities as well as potential (but currently not required or anticipated) activities. Within the existing SOA, the increase in supersonic flights is expected to be well within the limits that the Air Force established for the Gandy extension (U.S. Air Force, 1985).

Normally, ECTC missions will not restrict public access or transportation through the valley chosen for the ECTC arena. As is the current practice, civilian air travel in restricted airspace will require clearance from the MCC (Clover Control) at Hill AFB. Road access may be temporarily restricted an average of two hours during some tests for security or safety reasons. This will, however, be the exception rather than the rule. During the initial years of ECTC operation, road closures will occur only one to two times per year. As ECTC reaches full capability, road closures may occur as frequently as once a month. As the ECTC program evolves, a call-in system will be established to provide public information concerning road closures.

Use of the ECTC would build up over the next decade as the capability develops to its target level. The ECTC is expected to support 75 missions in 1991, increase to approximately 200 missions in 1993, and reach a steady-state level of approximately 1,500 missions per year by the year 2000. A mission may involve single

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or multiple aircraft that role-play a set of battlefield scenarios in the ECTC arena. A single mission could take as little as 30 minutes or last up to four hours. This translates into about 300 sorties (a sortie is defined as a single aircraft flight) and 120 mission hours on the UTTR in 1991, growing to about 8,000 sorties and 2,100 mission hours on the range in 2000.

At first, the work load will be easily accommodated in the current eight hours per day, five days per week operation. By target capability, the ECTC is expected to operate at least two eight-hour shifts per day, and involve occasional weekend use (once per month).

2.3.3.2 Threat sites

Each threat site will be operated by a three to seven person crew from the RMF. Activities at the site will include equipment checkout and calibration, operations, and minor maintenance and repair of threat and instrumentation equipment. RMF personnel will drive their personal cars to the RMF. Each threat site crew will then drive one vehicle to the site.

Until all threat sites are constructed, mobile self-contained threat simulators (up to twenty-five) will be used for some tests to augment the permanent sites. These simulators will be parked along existing roads or at threat sites that have not yet been constructed but have been surveyed for environmental effects.

In order to support various missions, the individual electronic threats will have to be moved from time to time among the sites. It is estimated that there will be 23 such movements in 1991, 130 in 1995, and 90 once the range reaches continuous operations in the late 1990s. The average weight of the loaded vehicle is

approximately 72,000 pounds, and will range from 55,000 pounds to 88,000 pounds.

The electronic threats will emit an electromagnetic signal at various frequencies aimed at the participating aircraft. The emissions may vary in strength as they sweep in a horizontal and vertical direction.

2.3.3.3 Range maintenance facilities (RMF)

The range maintenance facilities at Wendover, Michael AAF, and Sand Pass will deploy personnel to the individual threat sites as described above. Security crews will also deploy from these locations. In addition, approximately 350 helicopter trips will be made to and from the tactical threat area and 150 to and from the ITA and STA in the year 2000. The RMF will also house the security personnel and administration functions. Sand Pass will act as the main center for threat system repairs and range vehicle maintenance. Federally regulated hazardous material shipments will be limited to fuels, lubricants, and solvents. There will be no hazardous waste disposal at the Sand Pass RMF.

2.3.3.4 Other range components

Other range components such as the gapfiller radar, Micro-A stations, and security camera installations will not be manned, but will require periodic (preventive) maintenance and occasional repair. Roads, fiber-optics lines, power lines, and related facilities will also be maintained and repaired as necessary. These activities will involve occasional travel by light vehicles or helicopters throughout the deployment area. Transport of heavy materials, such as aggregate for road repair, will involve less frequent movements of heavy-duty trucks.

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2.3.3.5 MCC and related facilities

The MCC at Hill AFB and its collocated support facilities will operate in much the same way as the existing MCC for the UTTR, which it would replace. The new facility will also provide additional capabilities to support ECTC needs, including computer, data recording, and engineering test functions. The space formerly occupied by the existing MCC would be adapted for ECTC use as the new space became available. In all, approximately 167,500 sq. ft of new facilities would be constructed, beginning in 1992. Upon completion of all new facilities, the existing MCC facilities would be vacated and returned to base use.

2.3.3.6 Schedule and personnel

Table 2.3-3 shows the number of flights, employment, and threat sites expected at the TTA, ITA, and STA for each year from 1991 to 2000.

The permanent personnel associated with the ECTC will consist of a core group of people to keep the range operational and maintain the facilities and equipment. Personnel will include contractors, a few military, and civilian government employees. Current projections estimate that 640 new permanent personnel will work at Hill AFB by the year 2000. An additional 200 persons may work at various locations on the range. As with all aspects of the ECTC, this employment would build up over the next decade.

Most of the personnel projected to conduct the actual tests and exercises on the UTTR will be in a temporary status for the length of the test. These tests may be as short as a week, or as long as three to four months. These temporary assignments will be to Hill AFB to work at the MCC and on the UTTR itself to set up and operate

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Table 2.3-3. Range maintenance and ECTC flights for all alternative valleys.

	YEAR									
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Number of Flights	318	636	872	4525	5163	5897	6068	6768	7012	8128
TTA Sites	13	20	20	40	40	60	70	70	70	70
Employment										
Permanent	10	19	36	76	100	116	122	122	122	122
Temporary*	25	25	74	131	131	194	218	218	218	218
ITA Sites	0	0	0	0	10	10	10	10	10	10
Employment										
Permanent	2	2	4	6	6	6	6	6	6	6
Temporary*	0	0	0	0	50	50	50	50	50	50
STA Sites	0	0	10	10	10	10	20	20	20	20
Employment										
Permanent	1	1	15	29	43	44	46	46	46	46
Temporary*	0	0	43	43	43	43	73	73	73	73

* Peak Temporary Employment.

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the threat systems. Pilots and support personnel who operate and maintain the aircraft will also be in the region on a temporary basis. The number of temporary personnel at any one time will depend on when ECTC programs are scheduled. The number of temporary personnel on the ECTC at any one time will depend upon ECTC program schedules. In general, the peak number of temporary personnel at any time during the year will approximate the total permanent personnel a· ·igned to the ECTC.

Table 2.3-4 shows t! ıumber of flights and personnel for the proposed action with l AFB as the primary staging base. Note that there are a numk of flights that originate away from the ECTC region of influence (ROI). These locations are noted as remote in Table 2.3-4.

Table 2.3-4. Number of flights and personnel required for the proposed action at Hill AFB.

		FISCAL YEAR									
		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
PRIMARY HILL	Flights	169	452	664	3055	3569	4142	4266	4823	5017	5860
	Employment										
	Permanent	46	140	217	299	378	520	556	585	620	640
	Temporary*	73	91	123	175	221	268	298	375	350	433
SECONDARY MICHAEL	Flights	5	13	19	157	176	209	215	237	244	281
	Employment										
	Permanent	0	0	0	0	2	15	16	18	18	18
	Temporary*	1	2	2	6	8	11	11	14	14	16
REMOTE	Flights	144	171	189	1313	1418	1546	1587	1708	1751	1987
	Employment										
	Permanent	0	0	0	0	0	0	0	0	0	0
	Temporary*	0	0	0	0	0	0	0	0	0	0
TOTAL	Flights	318	636	872	4525	5163	5897	6068	6768	7012	8128
	Employment										
	Permanent	46	140	217	299	378	535	572	603	638	658
	Temporary*	74	93	125	181	229	279	309	389	364	449

* Peak Temporary Duty Employment.

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2.4 ALTERNATIVE ECTC ARENA FIGURATIONS

Two alternatives to the proposed configuration for the ECTC arena have been identified. They share the same intermediate threat area (ITA) and strategic threat areas (STAs), but differ in the location of the tactical threat area (TTA) and its range maintenance facility (RMF) and other support facilities. One alternative places the TTA in Snake Valley rather than Tule Valley, and the other places the TTA in Whirlwind Valley.

Construction activities and operations for the alternative valleys will be basically the same as described for the proposed action. Aggregate and water requirements will also be approximately the same as for the proposed action, varying only as the road construction mileage varies.

2.4.1 SNAKE VALLEY ALTERNATIVE

Snake Valley orientation is also north-south, is approximately 17 miles at its widest point, and is approximately 45 miles long. The small community of Eskdale is located at the southern end of the valley, where there are numerous roads and trails. The valley contains approximately ten ranches with the majority of them lying along the west side. The valley is flanked by the Snake Range to the west and the Confusion Range to the east. Terrain in the central part of the valley is generally flat, and ranges in elevation from 4,580 to 7,500 ft Mean Sea Level (MSL). Cowboy Pass connects Snake and Tule valleys. Snake Valley offers acceptable terrain for locating the TTA for the ECTC. Placement of the TTA offers a generally straight approach from the TTA to the STA, with approximately 60 miles of separation between the two. Flight paths would be constrained by the western boundary of UTTR restricted and military operations area (MOA) airspace, thus affecting

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variations in approach routes to the TTA required for realism and flexibility.

From a range and maintenance point of view, Snake Valley has some advantages over the other two alternative valleys. A well-maintained county road runs the entire length of the valley that could be utilized to facilitate movement of people and equipment to and within the TTA. The northern portion of the valley has numerous roads that could be used after appropriate improvements were made. Also, commercial power is already available in parts of the Snake Valley, although the system would undoubtedly require upgrading and expansion to provide power to the TTA sites.

Figure 2.4-1 depicts the first 13 threat site locations, referred to as the initial operating capability (IOC) sites, that have been identified for initial construction for this alternative.

Figure 2.4-2 shows the entire TTA, including the 13 IOC sites; possible locations for future sites; and the RMF for Snake Valley. As with the proposed Tule Valley TTA, all but the 13 IOC sites are representational only.

For this alternative, approximately 208 miles of main gravel roads will be upgraded and 191 miles of spurs will be upgraded or created, including access to the gapfiller radar site. Approximately four miles of road will be paved from U.S. Route 50 to the Snake Valley RMF (Figure 2.4-2).

The site for the gapfiller radar for the Snake Valley alternative is on Tunnel Mountain. Connection to the fiber-optics line for this alternative would require ground disturbance approximately 10 ft wide and 30 miles long to the Snake Valley RMF, predominantly along existing roads. Figure 2.4-3 shows the gapfiller radar site for Snake Valley.

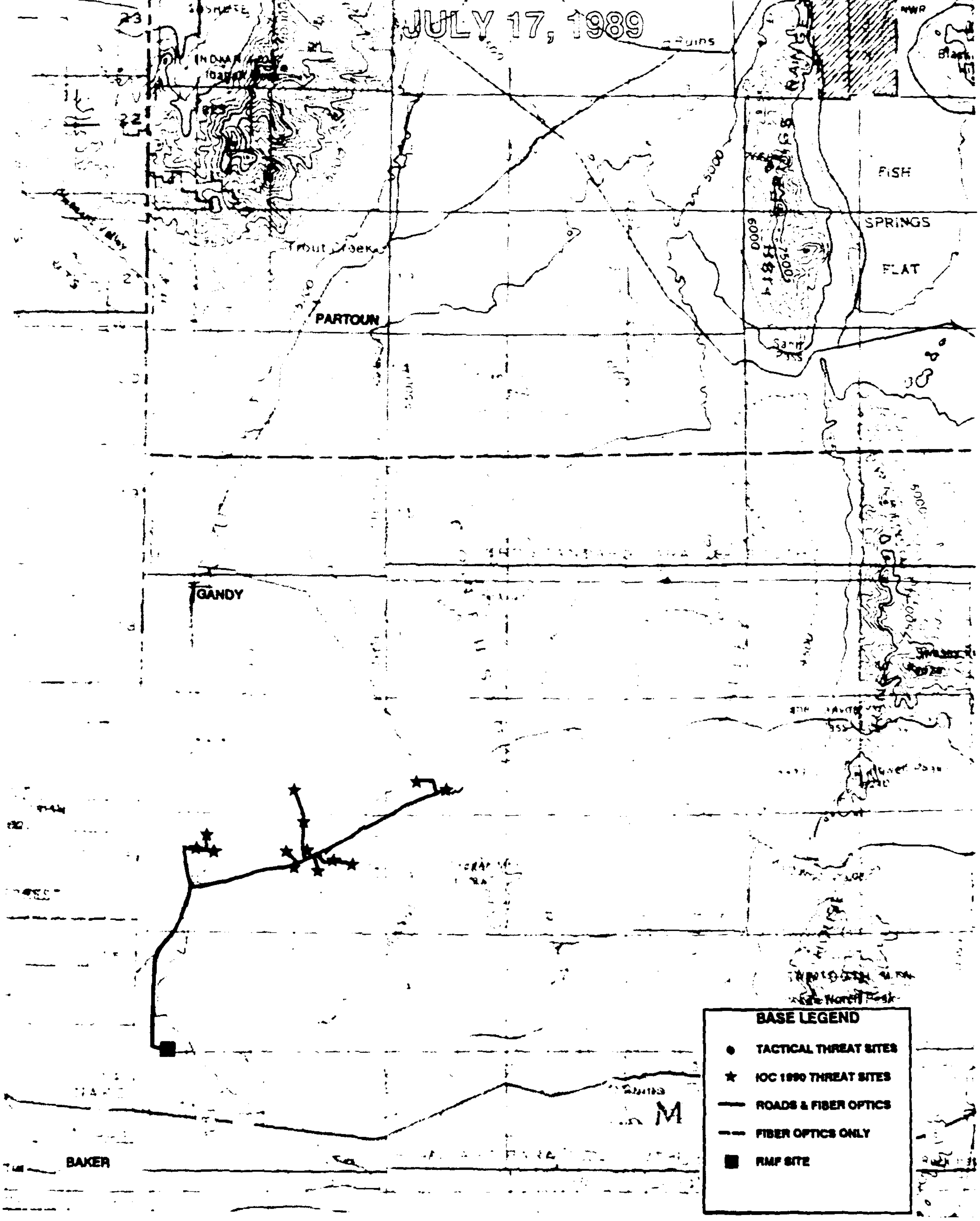

Figure 2.4-1. Snake Valley initial operating capability (IOC) threat sites.

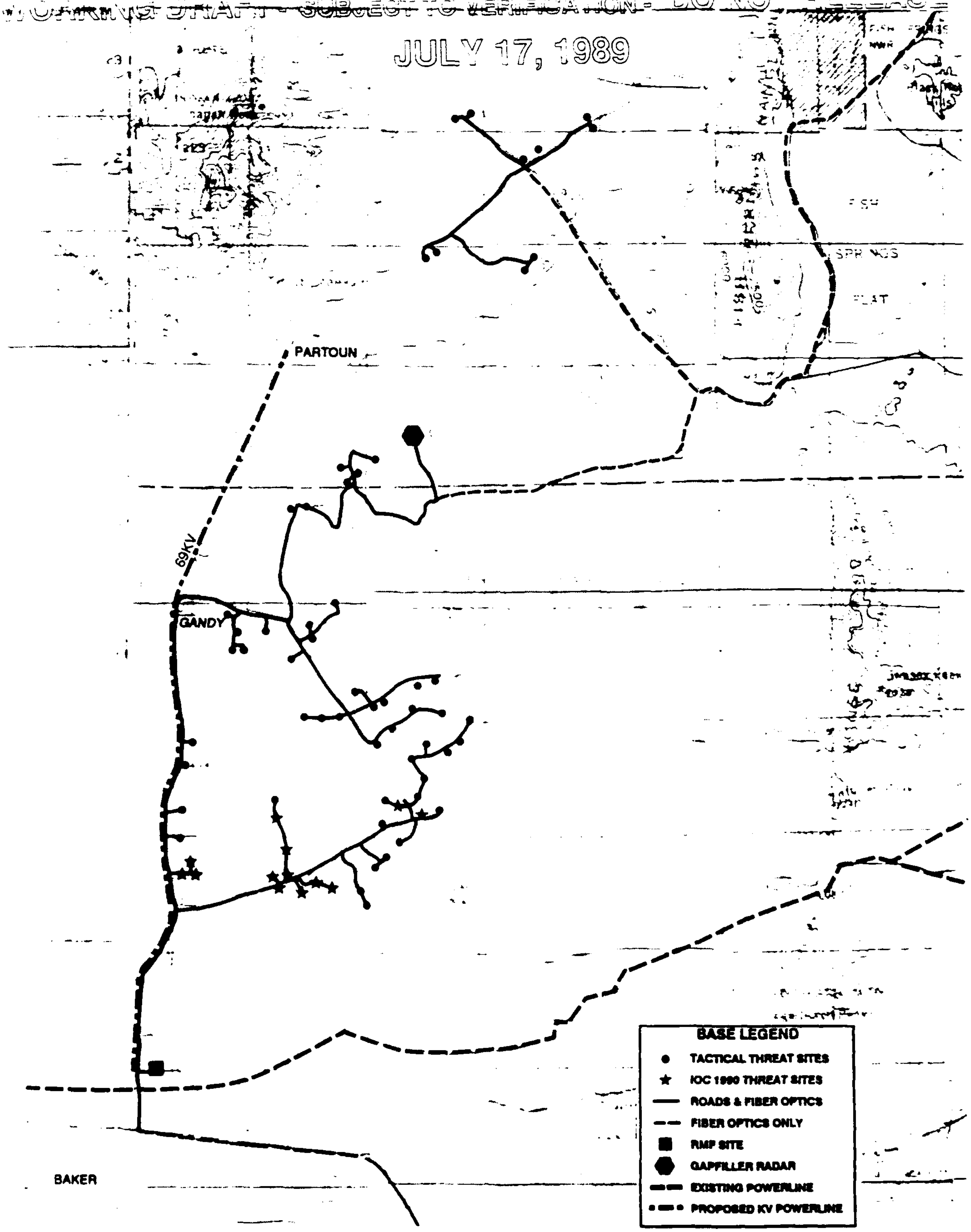

Figure 2.4-2. Snake Valley tactical threat area.

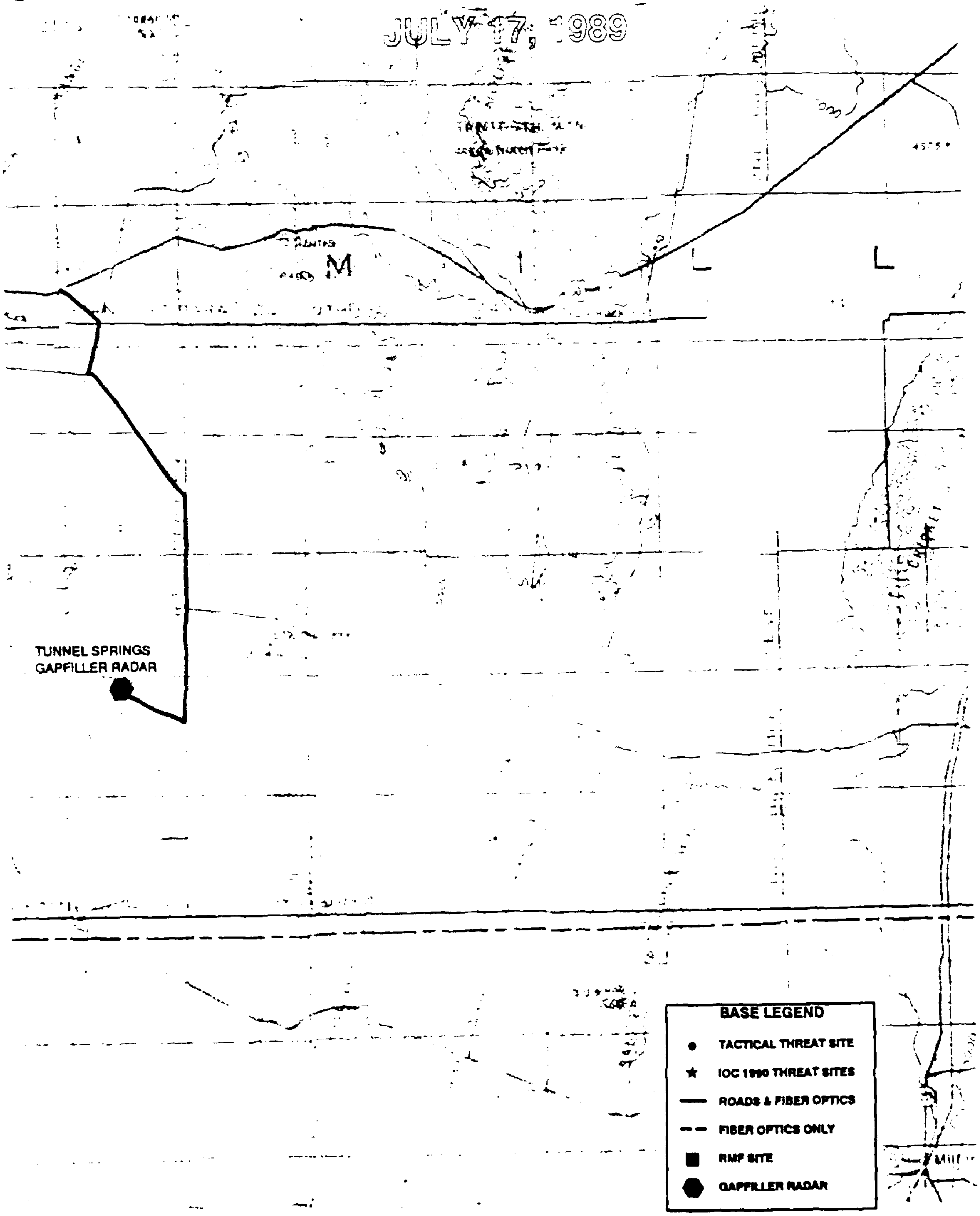

Figure 2.4-3. Snake Valley gapfiller radar site.

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The electrical transmission line to serve the Snake Valley RMF is proposed to head south from Partown along an existing roadway, and will serve both the RMF facility and the threat sites. This alternative will require approximately forty miles of construction to the RMF (Figure 2.4-2).

The spatial distribution of ECTC flights through Snake Valley is displayed in Figure 2.4-4.

2.4.2 WHIRLWIND VALLEY ALTERNATIVE

Whirlwind Valley has a north-south orientation, and is roughly 40 miles long and 12 miles wide. This valley is bordered by the Fish Springs and House ranges to the west, and the Drum Mountains and Thomas Range to the east. The terrain is more variable than in the other two valley alternatives, with sloping sides and central hilly areas north of Swasey Bottom and Table Knoll. There are no communities or ranches, but there are a number of mines in the Thomas Range and Drum Mountains. The northwest end of Fish Springs Flat contains the Fish Springs National Wildlife Refuge, a large series of lakes and ponds that are home to numerous birds and waterfowl.

Whirlwind Valley offers good capabilities for realistic operation of the ECTC. Some restrictions on military flight formations and maneuvers may be necessary due to the limited amount of restricted airspace available. Mining activity in the ranges that border the valley to the east would need to be considered and coordinated before conducting tests that involve electromagnetic (radiowave) transmission.

The existing road network for operations and maintenance (O&M) of ECTC equipment in Whirlwind Valley is acceptable. There are

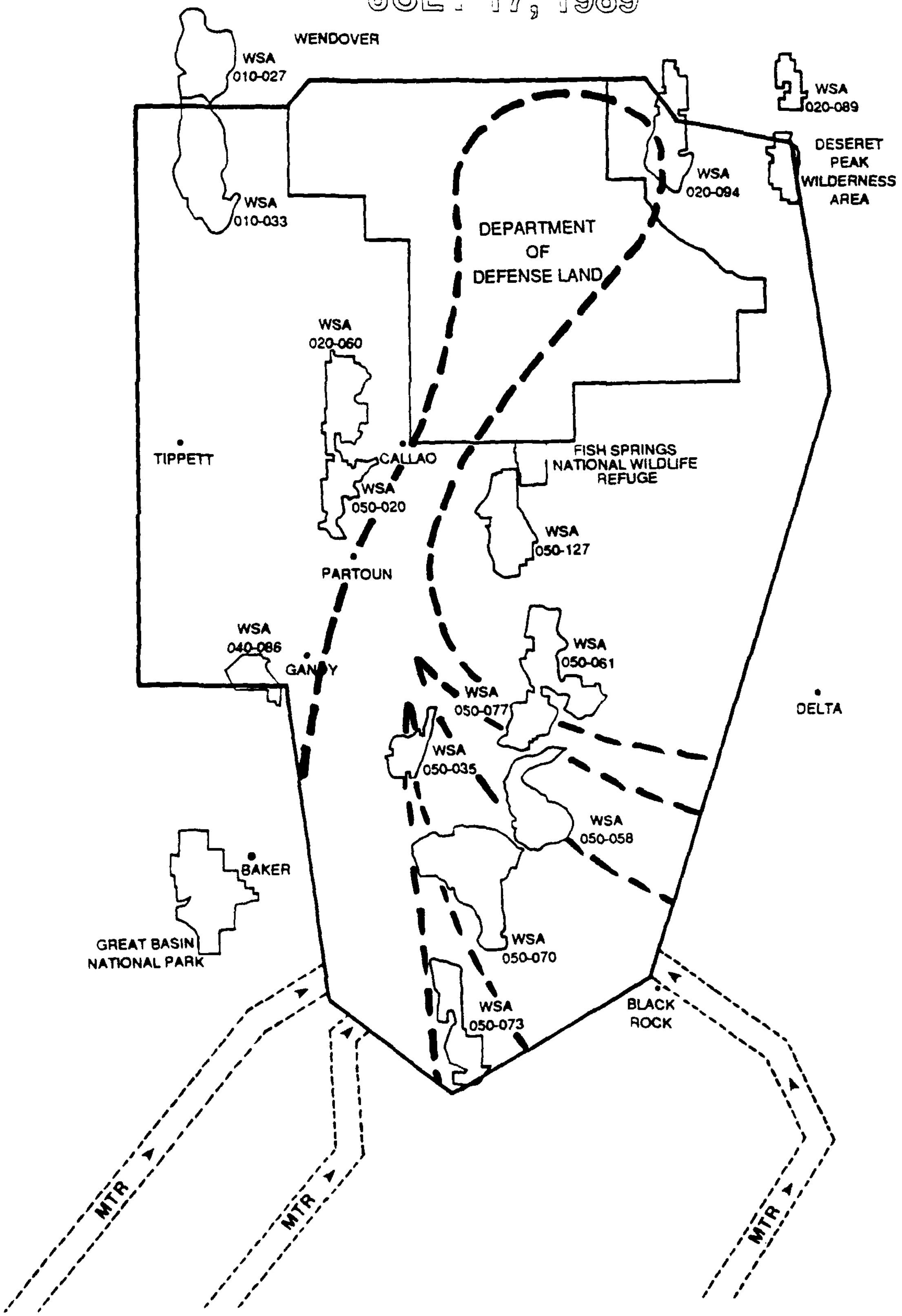

Figure 2.4-4. Spacial distribution of flights into and through Snake Valley.

relatively few roads in some parts of the valley, this would necessitate road building if the valley were to be chosen for the TTA. Existing roads in other parts of the valley will require upgrading and maintenance in order to remain open all year.

This valley offers somewhat limited potential for flexibility. The presence of the Fish Springs National Wildlife Refuge and the airspace configuration place undesirable restrictions on flexible routes approaching and transiting the valley.

Figure 2.4-5 shows the 13 IOC threat sites that will be constructed for this alternative. Figure 2.4-6 depicts the entire Whirlwind Valley TTA, including the IOC sites and possible locations for future sites, as well as the RMF. Again, all but the IOC sites are representational.

For this alternative, approximately 146 miles of main gravel roads will be upgraded and 268 miles of spur roads will either be upgraded or created, including access to the gapfiller radar site. The road to the RMF from Route 272 (several hundred yards) will be paved.

For Whirlwind Valley, the gapfiller radar site is the same as for the proposed action (Frisco Peak) and will require 92 miles of trenching for fiber-optic lines.

There are two alternative electrical transmission routes for the Whirlwind Valley RMF. The first would begin near the Intermountain Power Project (IPP) plant at Lyndyl and run approximately 28 miles northwest to the RMF. The second would run south, approximately 37 miles, from the RMF to the existing power line (Figure 2.4-6).

The spatial distribution of flights into and through Whirlwind Valley is shown in Figure 2.4-7.

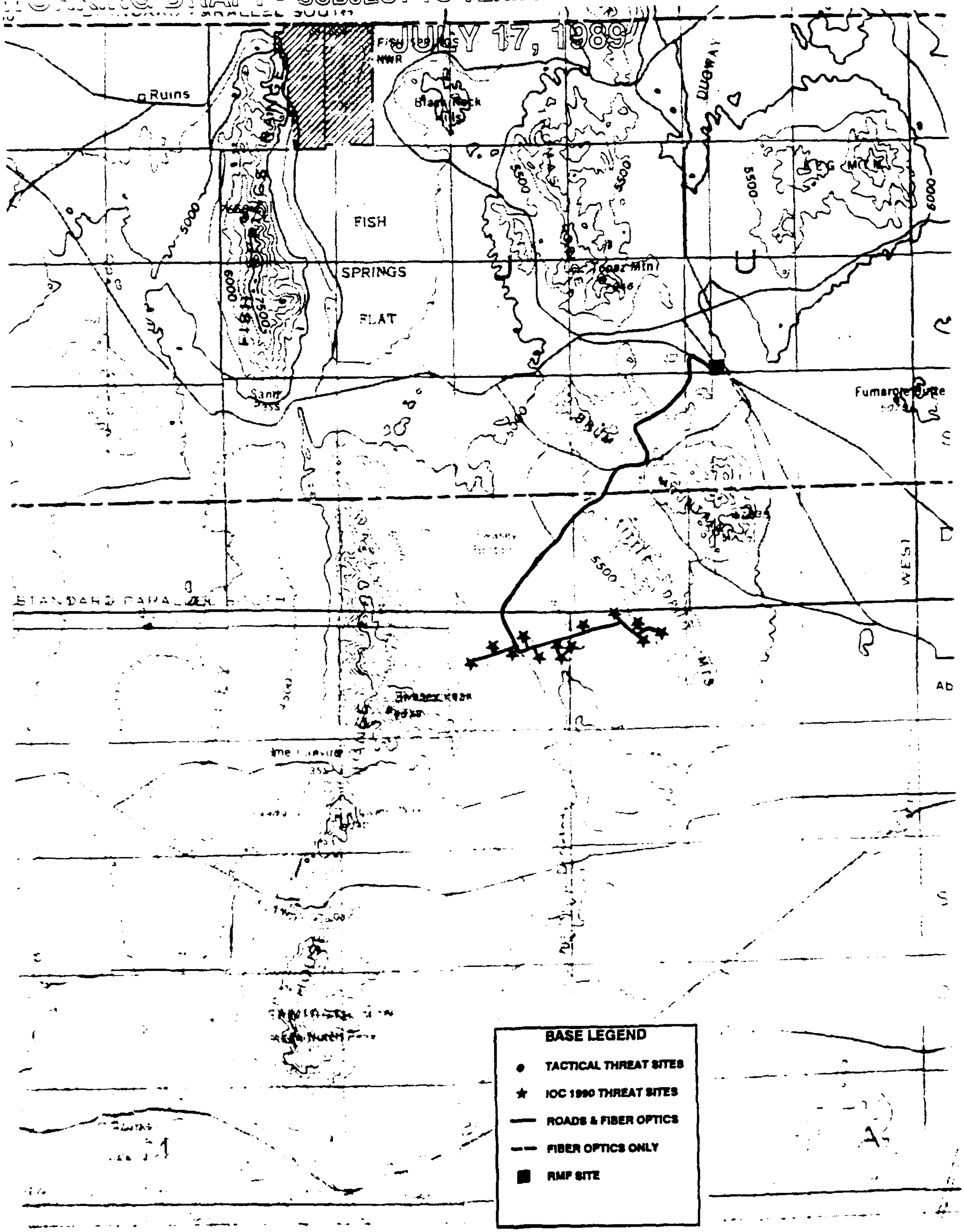

Figure 2.4-5. Whirlwind Valley initial operating capability (IOC) threat sites for 1990 construction.

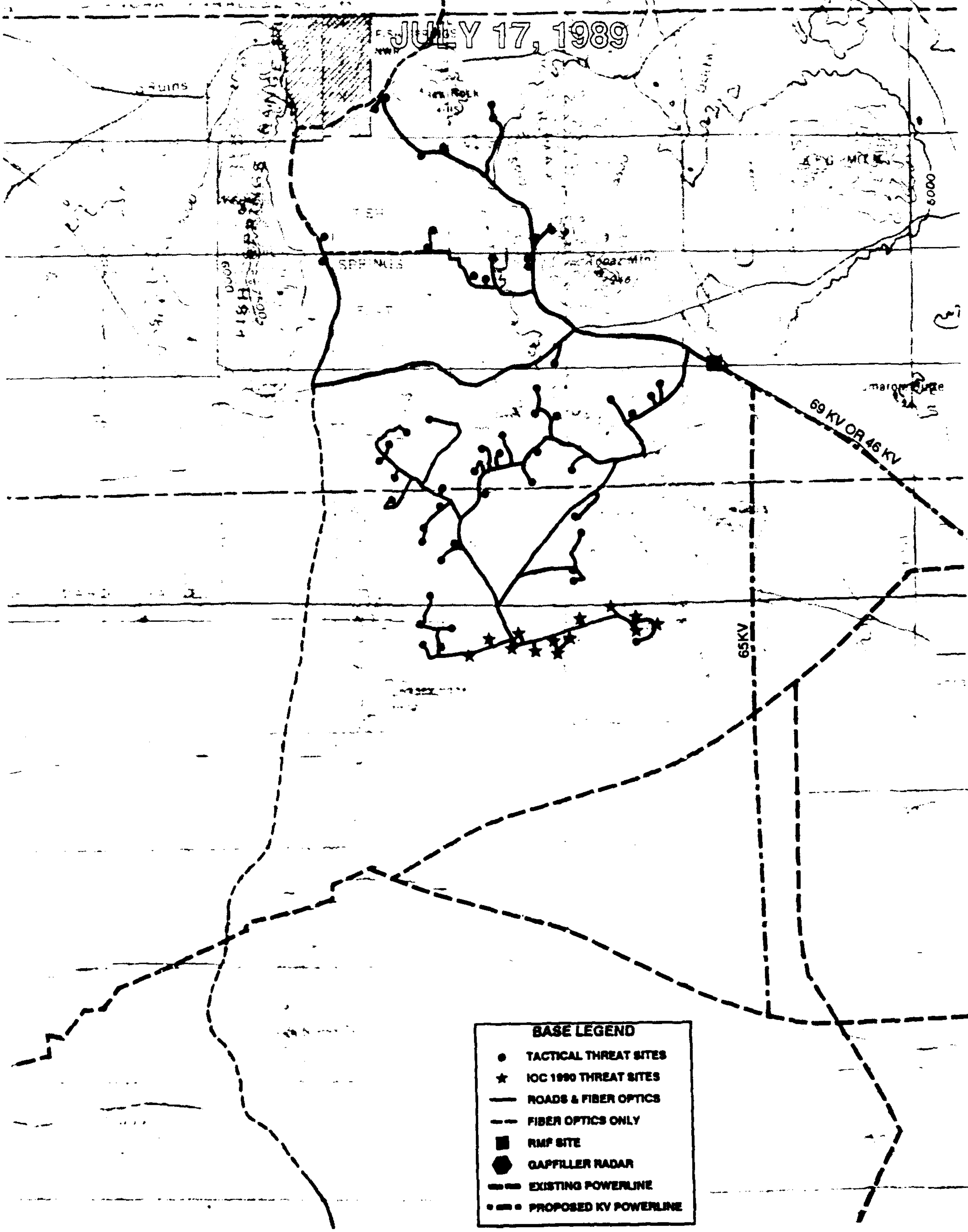

Figure 2.4-6. Whirlwind Valley tactical threat area.

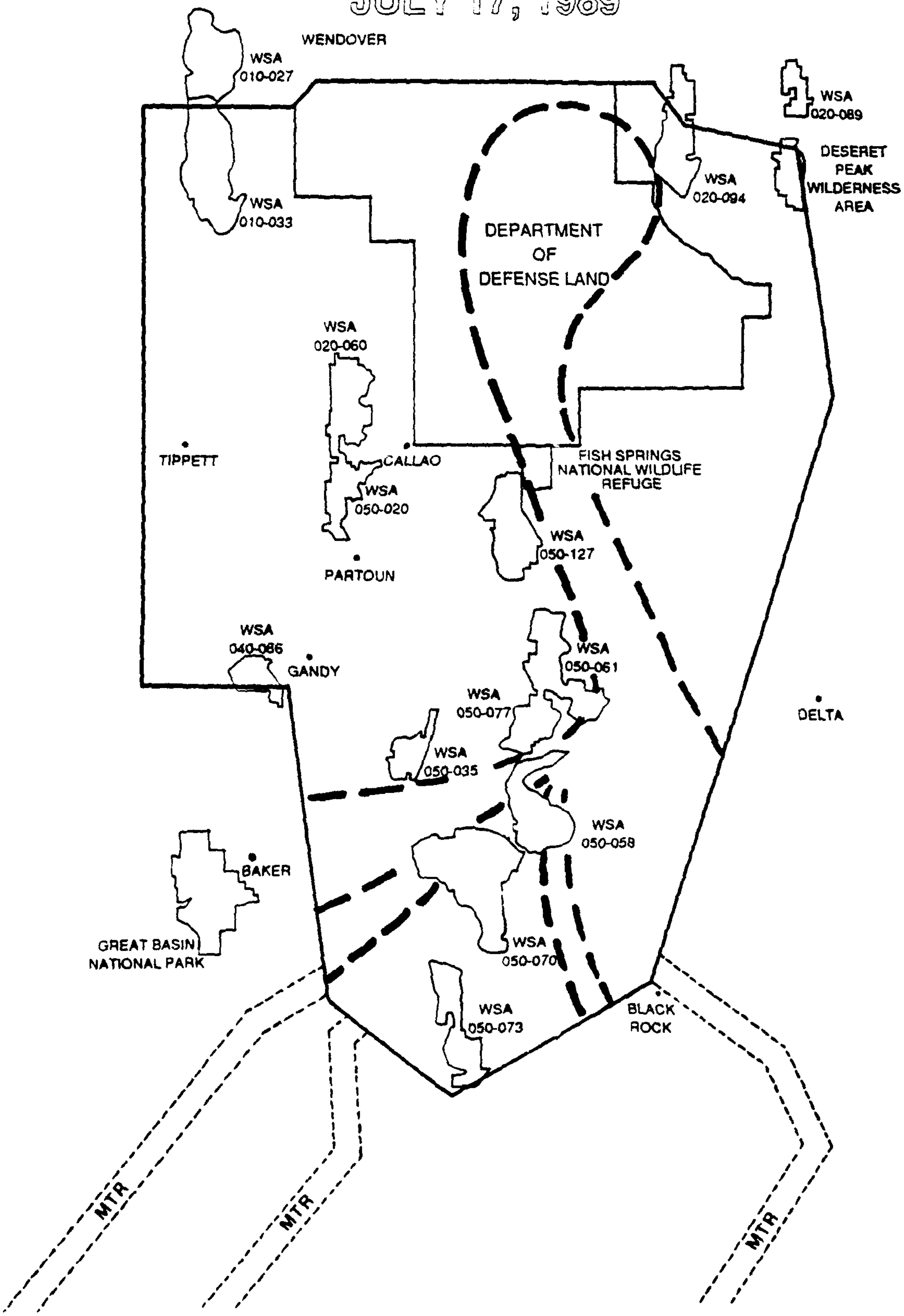

Figure 2.4-7. Spatial distribution of flights into and through Whirlwind Valley.

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2.5 ALTERNATIVE STAGING BASES

Five local airfields have been identified as alternative primary staging base candidates: Salt Lake International Airport (SLC), Michael Army Airfield (AAF), and the municipal airports of Wendover, Delta, and Fillmore. With each alternative, secondary staging will occur at Hill Air Force Base (AFB) and Michael AAF. In addition to the local staging alternatives, primary staging from remote locations outside the region of influence (ROI) is also being considered.

The facilities to be constructed at alternative staging bases vary according to what the existing facilities are at the airfield. Both the type of facilities to be constructed under the proposed action and alternatives for each primary staging base are shown in Figure 2.5-1.

There are slight differences between construction requirements at each location in the size of the required facility component or the amount of modification required to existing facilities. The magnitude of the differences in construction at each location is reflected in the size and timing of the construction work force at Michael AAF, SLC, Wendover, Delta, Fillmore, and remote basing (Table 2.5-1). The differences between each alternative and the proposed action for the use of aggregate and water are indicated in Table 2.5-2.

Operations at the alternative staging locations will be as described for the proposed action. The number of flights and personnel will vary among airports for the various alternatives. Table 2.5-3 presents the number of flights and employment by year with Michael AAF as the primary staging base. Tables 2.5-4 through 2.5-8 present the flights and employment associated with other

ACTIVITIES	HANGERS	RUNWAYS	TAXIWAYS	APRONS	LIGHTING	BILLETING	PARKING	ROADS	GATES	FENCING	NAV-AIDS	WEATHER STATION	MUNITIONS	FUELING	UTILITIES	HAZWASTE	TANKS, FUEL	TANKS, WATER	CYROGENIC STORAGE	ARRESTING BARRIER	CONTROL TOWER	GAS STATION	OPEN STORAGE	FIRE TRAINING PIT
HILL AFB PRIMARY	■		■	■	■	■	■	■	■	■				■										
HILL AFB SECONDARY	■			■	■	■	■	■	■	■				■										
MICHAEL PRIMARY	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			■	■	■	■		
MICHAEL SECONDARY	■	■		■	■						■	■	■											
SALT LAKE INTERNATIONAL	■			■			■						■	■										
WENDOVER																								
DELTA	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■
FILLMORE	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Figure 2.5-1. Facilities to be constructed for each primary staging-base alternative.

Table 2.5-1. Construction work force requirements (FTEs) at alternative staging bases.

Alternative	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Primary staging: Michael AAF	0	0	0	0	46	178	172	42	12	1	0
Secondary Staging: Hill AFB	0	0	0	0	1	6	23	18	0	0	0
Primary staging: SLC	0	0	0	0	6	32	37	27	11	0	0
Secondary Staging: Hill AFB	0	0	0	0	1	6	23	18	0	0	0
Michael AAF	0	0	0	0	0	0	17	70	52	0	0
Primary staging: Wendover	0	0	0	0	41	165	152	17	1	1	0
Secondary Staging: Hill AFB	0	0	0	0	1	6	23	18	0	0	0
Michael AAF	0	0	0	0	0	0	17	70	52	0	0

Table 2.5-1. Construction work force requirements (FTEs) at alternative staging bases (Continued).

Alternative	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Primary staging: Delta	0	0	0	0	41	163	178	57	11	0	0
Secondary Staging: Hill AFB	0	0	0	0	1	6	23	18	0	0	0
Michael AAF	0	0	0	0	0	0	17	70	52	0	0
Primary staging: Fillmore	0	0	0	0	35	125	165	57	11	0	0
Secondary Staging: Hill AFB	0	0	0	0	1	6	23	18	0	0	0
Michael AAF	0	0	0	0	0	0	17	70	52	0	0
Primary staging: Remote Basing	0	0	0	0	0	0	0	0	0	0	0
Secondary Staging: Hill AFB	0	0	0	0	1	6	23	18	0	0	0
Michael AAF	0	0	0	0	0	0	17	70	52	0	0

2.5-4

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Table 2.5-2. Differences from the proposed action in aggregate and water requirements for alternative primary staging bases.

Location	Agregate (1,000 tons)	Water (Acre-feet)
Michael AAF	860	160
SLC	220	20
Wendover AF	570	150
Delta AF	790	190
Fillmore AF	790	190
Remote Site	350	30

local airports (SLC, Wendover, Delta, and Fillmore) and remote locations as primary staging alternatives. Table 2.5-9 compares the number of flights for the year 2000 for the various staging alternatives.

Table 2.5-3. Michael Army Airfield: primary staging-base alternative.

Fiscal Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Primary										
Michael AAF										
Flights	5	13	19	157	176	2451	2505	2923	3034	3634
Employment:										
Permanent	2	2	4	6	12	68	84	94	94	94
Temporary*	1	2	3	6	58	208	208	270	275	315
Secondary										
Hill AFB										
Flights	166	452	664	3055	3569	1900	1975	2137	2227	2507
Employment:										
Permanent	46	140	216	301	377	518	565	576	612	632
Temporary*	73	91	123	175	221	122	121	162	164	184
Remote										
Flights	147	171	189	1313	1418	1546	1588	1708	1751	1987
Employment	0	0	0	0	0	0	0	0	0	0
Total:										
Flights	318	636	872	4525	5163	5897	60[illegible]	6768	7012	8128
Employment	122	235	346	488	668	916	978	1102	1145	1225

* Peak temporary duty employment.

2.5-6

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Table 2.5-4. Salt Lake International Airport (SLC): primary staging-base alternative.

Fiscal Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Primary:										
SLC										
Flights	0	0	0	0	0	2242	2290	2686	2790	3353
Employment:										
Permanent	0	2	2	9	21	62	106	111	113	113
Temporary	0	0	0	0	0	147	147	206	211	249
Secondary:										
Hill AFB										
Flights	166	452	664	3055	3569	1900	1975	2137	2227	2507
Employment:										
Permanent	46	140	216	301	377	512	565	576	612	632
Temporary	73	91	123	175	221	122	121	162	164	184
Secondary:										
Michael AAF										
Flights	5	13	19	137	176	209	215	237	244	281
Employment:										
Permanent	2	2	4	6	8	21	22	24	24	24
Temporary	1	2	2	6	58	61	61	64	64	66
Remote										
Flights	147	171	189	1313	1418	1546	1588	1708	1751	1987
Employment	0	0	0	0	0	0	0	0	0	0
Total:										
Flights	318	636	872	4525	5163	5897	6068	6768	7012	8128
Employment	122	237	347	497	685	925	1022	1143	1188	1268

Table 2.5-5. Wendover: primary staging-base alternative.

Fiscal Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Primary:										
Wendover										
Flights	0	0	0	0	0	2242	2290	2686	2790	3353
Employment:										
Permanent	1	3	17	38	78	142	202	212	214	214
Temporary	0	0	43	43	43	190	220	279	284	322
Secondary:										
Hill AFB										
Flights	166	452	664	3055	3569	1900	1975	2137	2227	2507
Employment:										
Permanent	46	140	216	301	377	512	565	576	612	632
Temporary	73	91	123	175	221	122	121	162	164	184
Secondary:										
Michael AAF										
Flights	5	13	19	137	176	209	215	237	244	281
Employment:										
Permanent	2	2	4	6	8	21	22	24	24	24
Temporary	1	2	2	6	58	61	61	64	64	66
Remote:										
Flights	147	171	189	1313	1418	1546	1588	1708	1751	8128
Employment	0	0	0	0	0	0	0	0	0	0
Total:										
Flights	318	636	872	4525	5163	5897	6068	6768	7012	8128
Employment	123	238	405	569	785	1048	1191	1317	1362	1442

Table 2.5-6. Delta: primary staging-base alternative.

Fiscal Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
<u>Primary</u>:										
Delta										
Flights	0	0	0	0	0	2242	2290	2686	2790	3353
Employment:										
Permanent	10	21	38	85	135	264	278	288	290	290
Temporary	25	25	74	131	131	341	365	424	429	467
<u>Secondary</u>:										
Hill AFB										
Flights	166	452	664	3055	3569	1900	1975	2137	2227	2507
Employment:										
Permanent	46	140	216	301	377	512	565	576	612	632
Temporary	73	91	123	175	221	122	121	162	164	184
<u>Secondary</u>:										
Michael AAF										
Flights	5	13	19	137	176	209	215	237	244	281
Employment:										
Permanent	2	2	4	6	8	21	22	24	24	24
Temporary	1	2	2	6	58	61	61	64	64	66
<u>Remote</u>:										
Flights	147	171	189	1313	1418	1546	1588	1708	1751	1987
Employment	0	0	0	0	0	0	0	0	0	0
<u>Total</u>:										
Flights	318	636	872	4525	5163	5897	6068	6768	7012	8128
Employment	157	281	457	704	930	1321	1412	1583	1538	1663

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Table 2.5-7. Fillmore: primary staging-base alternative.

Fiscal Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Primary:										
Fillmore										
Flights	0	0	0	0	0	2242	2290	2686	2790	3353
Employment:										
Permanent	0	2	2	9	35	98	156	166	168	168
Temporary	0	0	0	0	0	147	147	206	211	241
Secondary:										
Hill AFB										
Flights	166	452	664	3055	3569	1900	1975	2137	2227	2507
Employment:										
Permanent	46	140	216	301	377	512	565	576	612	632
Temporary	73	91	123	175	221	122	121	162	164	184
Secondary:										
Michael AAF										
Flights	5	13	19	137	176	209	215	237	244	281
Employment:										
Permanent	2	2	4	6	8	21	22	24	24	24
Temporary	1	2	2	6	58	61	61	64	64	66
Remote:										
Flights	147	171	189	1313	1418	1546	1588	1708	1751	1987
Employment	0	0	0	0	0	0	0	0	0	0
Totals:										
Flights	318	636	872	4525	5163	5897	6068	6768	7012	8128
Employment	122	237	347	497	699	961	1072	1198	1243	1315

Table 2.5-8. Remote airfields: primary staging-base alternative.

Fiscal Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Primary:										
Remote										
Flights	147	171	189	1313	1718	3457	3878	4394	4541	5339
Employment	0	0	0	0	0	0	0	0	0	0
Secondary:										
Hill AFB										
Flights	166	452	664	3055	3269	2230	1975	2137	2227	2507
Employment:										
Permanent	46	140	216	301	377	512	565	576	612	632
Temporary	73	91	123	175	221	122	121	162	164	184
Secondary:										
Michael AAF										
Flights	5	13	19	157	176	209	215	237	244	281
Employment:										
Permanent	2	2	4	6	8	21	22	24	24	24
Temporary	1	2	2	6	58	61	61	64	64	66
Total:										
Flights	318	636	872	4525	5163	5896	6068	6768	7012	8127
Employment	122	235	345	488	664	716	769	826	864	906

Table 2.5-9. ECTC distribution of flights in the year 2000.

	Primary staging alternatives						
Staging Components	Hill AFB	Salt Lake Int.	Michael Army Airfield	Wendover Airfield	Delta Airfield	Fillmore Airfield	Remote Site
Primary Staging:	5860	[3353]	3634	[3353]	[3353]	[3353]	5339
Secondary Staging: Hill AFB	0	2507	2507	2507	2507	2507	2507
Secondary Staging: Michael AAF	281	281	0	281	281	281	281

Note: as discussed, 4 preliminary staging alternatives have same number of flights.

Remote Site = Non-local airfield

[] = As primary staging base, zero if not chosen

: Preferred alternative

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2.6 ALTERNATIVE FIBER-OPTICS ROUTES

There are two alternative fiber-optic routes from Hill AFB to the South Range of the UTTR. The first alternative would utilize an existing railway right-of-way, that follows the Union Pacific railroad from Hill AFB south to Salt Lake City. The railroad then turns west and continues to Clive, UT, which is on the rail line approximately 1-1/2 miles south of I-80. At this point, one segment continues west via the rail line to Wendover AF and the other segment goes south into the South Range (see Figure 2.3-7). The second alternative would utilize an existing conduit from Hill AFB to Salt Lake City International Airport (SLC). From this point fiber-optic lines would be trenched and installed from the airport to the Union Pacific railroad right-of-way, and then to Clive.

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2.7 NO-ACTION ALTERNATIVE

The no-action alternative is defined as no development of an electronic combat test capability. Testing of weapons systems would be confined to current capabilities, relying mostly on computer modeling and simulation. The current, undesirable level of acquisition management risk caused by the lack of an electronic combat test capability would continue to increase.

Under the no-action alternative, the UTTR would continue to operate as a major test and training range. Other programs would continue to use the range and may propose future changes and improvements. Section 2.3.3.1 describes future UTTR flight activity without the ECTC program. Program details are contained within the various resources sections of Chapter 4.

The need for a realistic ECTC environment is especially significant due to the recent rapid expansion and sophistication of threat capabilities. By all indications, the scope and complexity of electronic combat systems will only continue to grow in the next decade as advanced weapon systems are deployed. The next generation of aircraft will be far more dependent on sophisticated, highly integrated avionics than the current latest-technology aircraft and will have to operate in increasingly hostile and sophisticated electronic threat environments. Without the ECTC, the Air Force would be unable to effectively test the performance of new weapons systems against these potential threats.

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2.8 COMPARISON OF ENVIRONMENTAL EFFECTS AMONG THE PROPOSED ACTION AND ALTERNATIVES

This section (1) summarizes the expected environmental impacts of the ECTC at the UTTR (Section 2.8.1), (2) compares the environmental effects of the ECTC among the proposed and alternative valleys (Section 2.8.2), (3) compares the environmental effects of the ECTC among the proposed and alternative staging bases (Section 2.8.3), and (4) compares the environmental impacts from construction of the first 13 threat sites with the proposed and alternative valleys (Section 2.8.4).

2.8.1 PLACEMENT OF THE ECTC IN THE UTTR

The following major environmental effects are expected if the ECTC is developed in the UTTR, regardless of the staging base or valley chosen. The only alternative to placing the ECTC in the UTTR is the no-action alternative.

Noise

Additional noise generated by ECTC aircraft will cause annoyance to people in the affected area during both the daytime and nighttime. Human startle-effects are likely to occur, which could lead to health and safety problems. An example of such an effect is the accidental discharge of a firearm by a hunter who is startled by the rapid onset of aircraft noise. Minor structural damage to old and weakened buildings is possible.

Ecological resources

Jet noise could adversely affect some animal species. Radio-frequency emissions from some threat simulators will be hazardous to airborne species (i.e., birds, owls, and bats) for distances of

several hundred feet from the simulator; and kills of some individuals are likely over the life of the program. Daily presence of large numbers of range personnel could adversely affect some animal species and their habitats.

Unique Federal lands

Additional noise generated by ECTC aircraft will degrade the wilderness characteristics of Wilderness Study Areas (WSAs) along and near the flight paths required for test activities. The ECTC may be incompatible with the Bureau of Land Management's (BLM's) mandate to manage WSAs to preserve their wilderness characteristics.

Socioeconomics

Depending upon the staging base alternative chosen, approximately 850 to 1,000 permanent jobs will be created by the year 2000. Additionally, approximately 1,250 to 1,700 individuals will be present within the project area at any one time on a temporary basis. Also, between 1,150 and 1,700 secondary jobs will be created. Regional spending due to construction will be approximately \$80 to \$140 million. Operations will be approximately \$44 million per year when the ECTC reaches maturity. The major adverse socioeconomic impact is degradation of the lifestyle of people in the selected valley due to day/night annoyance from aircraft noise and to temporary road closures.

2.8.2 VALLEY SELECTION

Table 2.8-1 compares the major environmental impacts expected to occur from the ECTC within the proposed and alternative valleys. Valley selection will occur in 1990 and the first 13 initial operating capability (IOC) tactical threat sites would be constructed in 1990.

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Table 2.8-1. Comparison of major environmental impacts of an ECTC in the proposed and alternative valleys.

Resource	Tule Valley (proposed)	Snake Valley	Whirlwind Valley
Air quality	No major impacts.	No major impacts.	No major impacts.
Ecological resources	o Jet noise could adversely affect some animal species. Long-term impacts are uncertain.	(Same as Tule Valley)	(Same as Tule Valley)
	- - - -	- - - -	o Jet noise could adversely affect a major migratory waterfowl resting and nesting area (Fish Springs National Wildlife Refuge).
	- - - -	o Construction could adversely affect Least Chub and water-fowl habitat.	- - - -
	o Radio-frequency emissions from some threat sites would be hazardous and some-times fatal to birds, bats, and ground ani-mals at distances of several hundred ft from these threat sites.	(Same as Tule Valley)	(Same as Tule Valley)

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Table 2.8-1. Comparison of major environmental impacts of an ECTC in the proposed and alternative valleys (Continued).

Resource	Tule Valley (proposed)	Snake Valley	Whirlwind Valley
Ecological resources (continued)	o Daily presence of large numbers of range personnel traveling to and from threat sites and RMF could adversely affect some animal species and their habitat.	(Same as Tule Valley)	(Same as Tule Valley)
Unique Federal lands	o ECTC may be incompatible with management of Wilderness Study Areas by the Bureau of Land Management.	(Same as Tule Valley)	(Same as Tule Valley)
	- - - -	- - - -	o ECTC may be incompatible with management of the Fish Springs National Wildlife Refuge by U.S. Fish and Wildlife Service.
Cultural resources	- - - -	o Major adverse impacts possible to Native American cultural resources.	(Same as Snake Valley)

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Table 2.8-1. Comparison of major environmental impacts of an ECTC in the proposed and alternative valleys (Continued).

Resource	Tule Valley (proposed)	Snake Valley	Whirlwind Valley
Air space	No major impacts.	No major impacts.	No major impacts.
Noise	o Parts of west-central Utah would become much noisier, especially during the night when 30% of ECTC missions would be conducted.	*(Same as Tule Valley)*	(Same as Tule Valley)
Land use	o *ECTC may not be com*patible with public use of land, particularly recreation (see "Unique Federal Lands").	*(Same as Tule Valley)*	*(Same as Tule Valley)*
Socio-economics	- - - -	o Significant adverse impacts in Baker and Garrison due to stresses on community services from range workers choosing to live in these towns. Major impacts to life-styles of residents of these towns can be expected.	- - - -

Table 2.8-1. Comparison of major environmental impacts of an ECTC in the proposed and alternative valleys (Continued).

Resource	Tule Valley (proposed)	Snake Valley	Whirlwind Valley
Water resources	No major impacts.	No major impacts.	No major impacts.
Health and safety	- - - -	o ECTC operations may cause major interference problems with radio, television, and other communication systems.	(Same as Snake Valley)
	o Microwave emissions from some threat sites could be hazardous to people in vicinity (see "Ecological Resources" for effects on wildlife).	(Same as Tule Valley)	(Same as Tule Valley)

2.8.3 PRIMARY STAGING BASE SELECTION

Table 2.8-2 compares the major environmental impacts expected to occur from the ECTC at the proposed and alternative primary staging bases. Construction of a primary staging base would begin in 1994, with operations beginning in 1996. Until that time, staging will be conducted from Hill Air Force Base (AFB), and Michael Army Airfield (AAF).

2.8.4 COMPARISON OF INITIAL OPERATIONAL CAPABILITY IMPLEMENTATION IN EACH VALLEY

Construction in 1990 to develop an initial ECTC capability would include 10 to 13 tactical threat sites with their spur roads, and necessary improvements of existing fiber optics lines along the roads to the site for the respective range maintenance facility (RMF). Buried electrical cables and fiber-optics lines will also be installed along the same roads for future use. The selected site for the RMF will be used as a staging area for construction and interim operations.

Preconstruction surveys were conducted at each of the 13 threat sites in each valley to determine potential impacts. Surveys included ecological and cultural resources. These surveys included the following:

Ecological Resources

- o Threatened and Endangered (T&E) Species
- o Candidate (possible T&E) Species
- o Species of Local Concern
- o Seasonal Use Areas and Critical Habitats

Table 2.8-2. Comparison of major environmental impacts among the various staging base alternatives.

	Hill AFB (proposed)	Michael Army Airfield	Salt Lake City International Airport	Wendover Airfield	Delta Airfield	Fillmore Airfield
Air quality	Increase in hydrocarbon emissions (a precursor to ozone) in a county currently in violation of ozone				Approximately 5.6% increase in county emissions for HC (a precursor to ozone), but no violation of ozone standard	Same as Delta
Ecological	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives
Unique Federal lands	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives
Cultural resources	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	Historic property on National Register	No major impacts under any alternatives	No major impacts under any alternatives
Air space	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives
Land use	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives	No major impacts under any alternatives

Table 2.8-2. Comparison of major environmental impacts among the various staging base alternatives (Continued).

	Hill AFB (proposed)	Michael Army Airfield	Salt Lake City International Airport	Wendover Airfield	Delta Airfield	Fillmore Airfield
Noise	Residential population potentially annoyed by increased airport noise		Residential population potentially annoyed by increased airport noise	Large increase in residential population potentially annoyed by increased airport noise		Large increase in residential population potentially annoyed by increased airport noise
Socio-economics	Primary and secondary jobs created	Jobs created Shortage of education personnel	Jobs created	Jobs created Shortage of education personnel and possibly facilities Shortage of housing Water-delivery shortage if current planned increases in system capacity are not made	Jobs created Shortage of education personnel	Jobs created Major shortage of education personnel Shortage of housing Shortage of community service personnel Impacts to rural lifestyle
Water resources	No major impacts	No major impacts	No major impacts	No major impacts	No major impacts	No major impacts
Health and safety	No major impacts	No major impacts	No major impacts	No major impacts	No major impacts	No major impacts

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Cultural Resources

- o Archaeological Resources
- o American Indian Traditional Cultural and Religious Values

Ecological resources may be affected as follows:

- o The Snake Valley RMF and Tule Valley Sites 1B, 1F, and 1I were all relocated due to operational considerations after the May 1989 survey for T&E blooming plants. Since it is only possible to identify certain T&E species while they are in bloom, it is not possible to attest to the existence of several T&E plants at these new sites.

- o Snake Valley tactical threat sites S3A, S3B, and S5D lie near a critical Least Chub habitat at Twin Springs. Construction and operation of these sites as presently planned could affect the Least Chub (T&E species) and waterfowl using the area, due to lost or degradation of habitat, human interference, and electronic emissions.

Known archaeological resources will not be significantly affected by land disturbance associated with construction of initial threat sites in any valley. American Indian traditional cultural and religious values would be more affected under the Snake or Whirlwind valley alternative than under the proposed action because more Indian ancestors lived in these valleys and more spirits would be disturbed by construction activities.

2.8.5 NO ACTION ALTERNATIVE

Without an ECTC, the Air Force would be unable to effectively test the performance of new weapons systems against potential threats. The UTTR would continue to be used for aircraft testing and

training as it is currently, and other projected programs at the UTTR and Hill AFB would still be implemented as planned.

2.8.6 MITIGATION

Mitigation measures capable of reducing the environmental impacts identified in this EIS are described in Chapter 4. These measures are in addition to any provisions required by permit and approval agencies such as the BLM, the State of Utah, the Federal Aviation Administration, the Federal Communications Commission, and other Federal agencies. Some of the measures described in Chapter 4 are contingent on location of the activity.

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Chapter 3
AFFECTED ENVIRONMENT

3.1 PHYSICAL FEATURES

3.1.1 TOPOGRAPHY

The ECTC region of influence (ROI) lies within the eastern part of the Basin and Range physiographic province, which is characterized by north-trending mountain ranges and intervening valleys. The dominant highlands are shown in Figure 3.1-1. Peaks within these mountains range in elevation from 5,000 to 10,000 ft, except for the Deep Creek Range which rises to 12,100 ft. Elevations along the floors of the valleys generally range from 4,400 to 5,200 ft.

Tule, Snake, and Whirlwind valleys open to the north into the Great Salt Lake Desert; a relatively flat alluvial plain ranging in elevation from a low of 4,225 ft to 4,254 feet.

3.1.2 GEOLOGY

Thick sequences of marine sediments accumulated in a broad region of western Utah and eastern Nevada during Paleozoic and early Mesozoic time (600 to 200 million years ago). As a result of the tectonic events discussed below, these deposits are now exposed within the highlands of the study area.

In mid-Mesozoic through early Tertiary time (180 to 50 million years ago), western Utah underwent east-directed thrust faulting and folding, magmatic intrusion, uplift, and subsequent erosion. Structures related to this event are evident in the Confusion Range and Cedar Mountains. The granitic rock at Notch Peak in the southern House Range is related to this event.

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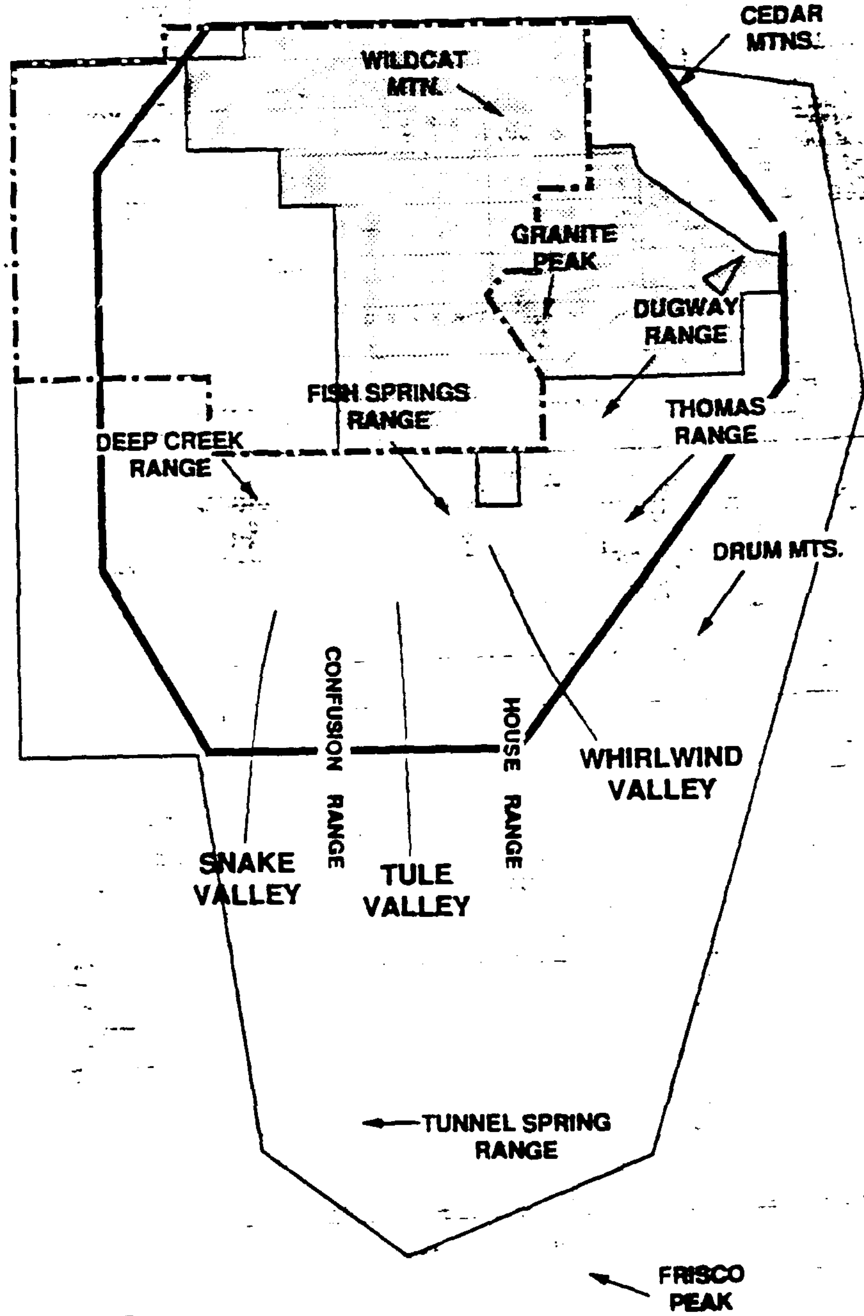

Figure 3.1-1. Topographic setting of the ECTC.

Crustal extension, widespread volcanism, and associated igneous intrusion began about 50 million years ago throughout the Basin and Range Province. In the study area, the main pulse of this volcanic activity was centered around the Thomas, Keg, and Desert calderas. Although isolated outcrops of volcanic rocks occur throughout the study area, the Thomas Range and the Drum and Little Drum mountains contain the thickest accumulations of volcanic strata. Crustal extension accelerated during and after this volcanic activity in west-central Utah, initiating large-scale block faulting that resulted in the present topography of the Basin and Range.

Rock debris and isolated volcanic flows have accumulated in the valleys of the study area during the past several million years. During this time, the Great Salt Lake Desert and the surrounding valleys were periodically filled with waters from Lake Bonneville, the largest late Pleistocene lake in western North America. Wave-cut terraces from Lake Bonneville are evident in many of the valleys of west-central Utah.

Crustal extension, block-faulting, and volcanism have continued through the present time in western Utah.

3.1.3 SOILS

Major soil associations in the region of influence are described in Henningson et al. (1981a). These soils are distinguishable from one another largely on the basis of elevation and on the composition of underlying bedrock. In general, soils are poorly developed throughout the region because of a lack of precipitation and because internal drainage has concentrated a variety of salts in the valley bottoms.

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3.1.4 CLIMATE

West-central Utah is characterized by hot, dry summers, cool springs and falls, moderately cold winters, and a general lack of year-round precipitation. During the winter, storm systems are separated by two- to three-week periods of stagnant high pressure systems that tend to trap cold air in the valleys and create fog.

The summer storm track is far to the north and seldom affects western Utah; the result is hot and dry summers. Summer thunderstorms have the potential for extensive flash flooding and subsequent soil erosion. Since elevation and topography greatly influence the amount of precipitation, average annual rainfall varies significantly throughout the region. Average annual precipitation ranges from five inches in the valleys to more than 30 inches in the highlands.

Temperatures in the study area are highly variable both seasonally and daily. Daily maximum temperatures range from the 30s and 40s°F in January to the 80s and 90s°F in July. Minimum temperatures tend to range between 10 to 20°F in January and 40s and 50s°F in July. The average daily range is about 52°F in the winter and 61°F in the summer.

Orientation of the mountain ranges results in valley surface winds that are predominantly from the north or south. This pattern can be modified at night by downslope winds produced by cool, dense air flowing from higher elevations toward the valley floor. Light winds of local origin are generally southeasterly at night and northwesterly in the daytime over the valley floors. Winds near the mountains usually have very different local effects and do not reflect the general nighttime southwest and daytime northwest patterns.

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The north-south trending Wasatch Range strongly influences the wind patterns at Hill Air Force Base (AFB), and forms a barrier just to the east of the Ogden area. Hill AFB is surrounded on the north, west, and south by the Great Salt Lake Desert. In addition to the mountains and the lake basin, the Weber River Canyon east of the Base creates a predominant wind from the east-southeast throughout the year; winds from that direction occur more than 35 percent of the time (Hill AFB, 1986). The high frequency of these winds is due to the strong flow of air that frequently comes down the mountain slopes and out of the canyon toward the Great Salt Lake. During the day, the return wind flow from the lake and valley floor is less unidirectional and more representative of the valley wind flow.

The average wind speed is fairly uniform throughout the year, with winds averaging seven knots around Hill AFB and five knots at Dugway Proving Ground (DPG). At Hill, wind speeds range from a low of six knots in November and December to a high of eight knots in February, March, and August. At Dugway, wind speeds range from a low of three knots in December to a high of six knots from March through June (DPG, 1982).

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JULY 17, 1989

3.2 AIR QUALITY

3.2.1 DEFINITION OF RESOURCES, ISSUES, AND CONCERNS

The air quality in a given location is described by the concentration of various pollutants in the atmosphere expressed in units of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). The significance of impacts on air quality, measured in terms of ground-level pollutant concentrations, is determined by comparison with Federal and state air quality standards. Standards represent allowable pollutant concentrations at which public health and welfare are protected, with a reasonable margin of safety. The pollutants of concern are primarily those for which Federal or state ambient air quality standards have been established, including ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), total suspended particulates (TSP), particulate matter less than 10 microns in aerodynamic diameter (PM_{10}), and lead (Pb). The factors that affect air quality are pollutant emission rates, emission parameters, topographic features, the cumulative effect of other emission sources, chemical reactions, and meteorological conditions. The meteorological parameters most affecting pollutant dispersion are wind speed, wind direction, atmospheric stability, mixing height, temperature, and relative humidity.

3.2.2 REGULATORY SETTING

The Clean Air Act of 1977 (42 USC 7401-7642), as amended, is the principle legislation governing the maintenance of air quality standards. The U.S. Environmental Protection Agency (EPA) retains implementation authority of regulations promulgated pursuant to the Act although this right is delegated, where possible, to the states. The State of Utah and the State of Nevada have received

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implementation and enforcement authority from the EPA. Thus, air pollutant emissions from ECTC activities on private and public lands must comply with regulations and standards established by Federal, state, and county regulatory agencies.

The EPA has established National Ambient Air Quality Standards (NAAQS) at 40 CFR Part 50 for criteria pollutants determined to be injurious to human health and welfare. Primary NAAQS protect human health while secondary NAAQS protect public welfare. The states of Nevada and Utah use the NAAQS as components of their State Implementation Plans (SIPs) to determine the attainment status of each county for criteria pollutants. The NAAQS are shown in Table 3-1. Attainment status indicates that an air quality is better than NAAQS for a particular criteria pollutant. A nonattainment area, is an area where the NAAQS for a particular criteria pollutant have been exceeded. An area may simultaneously be classified attainment and nonattainment for different criteria pollutants.

Nonattainment areas require a "New Source Review" for all new major stationary sources. A major source is defined as sources of air pollutants which emit, or have the potential to emit, 100 tons per year or more of any pollutant (Utah Air Conservation Regulations, 1.1.75, updated 1988). The applicability of these regulations to ECTC-related emissions is addressed in Section 4.2.

The Utah and Nevada SIPs incorporate methods to maintain attainment (prevent significant deterioration) in areas where air quality levels have not exceeded NAAQS criteria. Areas in non-attainment require a "New Source Review" control strategy for attaining NAAQS by a specified date. Such a control strategy must include a plan for siting new stationary sources to ensure that the resulting air quality will improve rather than deteriorate.

Table 3-1. National Ambient Air Quality Standards (NAAQS).

Pollutant / Averaging Time	Primary standard $\mu g/m^3$	Primary standard ppm	Secondary standard $\mu g/m^3$	Secondary standard ppm
Total suspended particulates (annual)[a]	75		60	
Total suspended particulates (24-hour)	260		150	
PM10 (annual)[a]	50		50	
PM10 (24-hour)	150		150	
Sulfur Dioxide (annual)[b]	80	0.03	NA[c]	NA
Sulfur Dioxide (24-hour)	365	0.14	NA	NA
Sulfur Dioxide (3-hour)	NA	NA	1,300	0.5
Carbon Monoxide (8-hour)	10,000	9	10,000	9
Carbon Monoxide (1-hour)	40,000	35	40,000	35
Ozone (1-hour)	235	0.12	235	0.12
Nitrogen Dioxide (annual)[b]	100	0.05	100	0.05

[a] Annual geometric mean
[b] Annual arithmetic mean
[c] Not applicable

3.2.3 EXISTING AIR QUALITY

The greater part of the UTTR to the west of the Great Salt Lake is an attainment area for all NAAQS. However, nonattainment areas do exist for some pollutants along the Wasatch Front, especially near Salt Lake City. Table 3-2 lists the counties that are potentially affected by ECTC activities and the pollutants for which each county is in nonattainment.

Table 3-2. Status of county attainment for air pollutants.

County[a]	Attainment	Non-Attainment (pollutants listed)
Utah:		
Box Elder	X	
Weber		CO[1], O_3[2]
Davis		CO, O_3
Salt Lake		CO, O_3, SO_2[3], TSP[4]
Tooele		SO_2, (>5600 ft)
Utah	X	
Juab	X	
Millard	X	
Beaver	X	
Nevada:		
White Pine	X	
Elko	X	

[a] Location of these counties is shown on Figure 3-16.
[1] Carbon monoxide
[2] ozone
[3] sulfur dioxide
[4] total suspended particulates

3.3 ECOLOGICAL RESOURCES

3.3.1 DEFINITION OF RESOURCE, ISSUES, AND CONCERNS

Biological resources are native or naturalized plants and animals and the habitats in which they occur. They include plant populations and communities, wildlife populations and their relationship to habitat, and aquatic, wetland, and riparian ecosystems. Also included are species listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS), species having equivalent status at the state level, and species under consideration for listing as threatened or endangered.

Native and naturalized plant and animal populations within the program area have the potential to be affected adversely by proposed ECTC activities. Wildlife and wildlife habitats are protected under numerous Federal laws, such as the Endangered Species Act, the Bald and Golden Eagles Protection Act, the Migratory Bird Treaty Act, the Sikes Act, the Wild Horses and Burros Protection Act, and Executive Order 11870 (Environmental Safeguards to Animal Damage on Federal Lands). Stream and wetland habitats are protected under the Clean Water Act and Executive Order 11990 (Protection of Wetlands).

The primary region of influence for this analysis is all land and airspace [restricted areas and military operations areas (MOAs)] on the South Range of the UTTR. This includes the Gandy, Sevier A, and Sevier B MOA, and alternative staging base locations at Michael Army Airfield (AAF), Salt Lake City, Wendover, Delta, and Fillmore. This area corresponds roughly with the southern portion of the Great Salt Lake Desert, the northern portion of the Sevier Desert, and the intervening valleys (Snake, Tule, Whirlwind, and Skull) and mountain ranges (House, Confusion, Fish Springs, Deep Creek, Dugway, and Thomas ranges and the Cedar Mountains). Since

most of the proposed and alternative activities and facilities are located in Snake, Tule, and Whirlwind valleys, environmental data and analysis are focused on these areas.

3.3.2 VEGETATION

The program area lies in the eastern portion of the Artemisian biotic province, which covers southeastern Oregon, southern Idaho, northeastern California, western Utah, and most of Nevada. This area is dominated by vast sagebrush-covered plains, above which rise isolated, partly forested mountains (Dice, 1943). The province occupies, in the main, the physiographic section known as the Great Basin. Because harsh environmental conditions such as low rainfall, high temperatures, and accumulations of alkaline salts in the undrained basins exist throughout this region, many plants of a specialized nature have evolved.

In the ECTC area, composition and diversity of plant species change dramatically with elevation and landform (Figure 3.3-1). The primary plant communities in the study area include salt desert shrub, Great Basin sagebrush, piñon-juniper woodland, and upper montane. At the lowest elevations along mudflats or dry lake beds (playas), vegetation is nearly nonexistent. Infrequent precipitation, flooding, high salinity, and fine-grained soils limit establishment of vegetation. Some salt-tolerant plants that can withstand such harsh environmental conditions are iodinebush (Allenrolfea occidentalis), pickleweed (Salicornia rubra), and saltgrass (Distichlis spicata).

The salt-desert shrub community occurs along the margins of the playas. Iodinebush, pickleweed, and saltgrass become interspersed with shadscale (Atriplex confertifolia), four-winged saltbush (Atriplex cannescens), greasewood (Sarcobatus vermiculatus), and alkali sacaton (Sporobolus airoides).

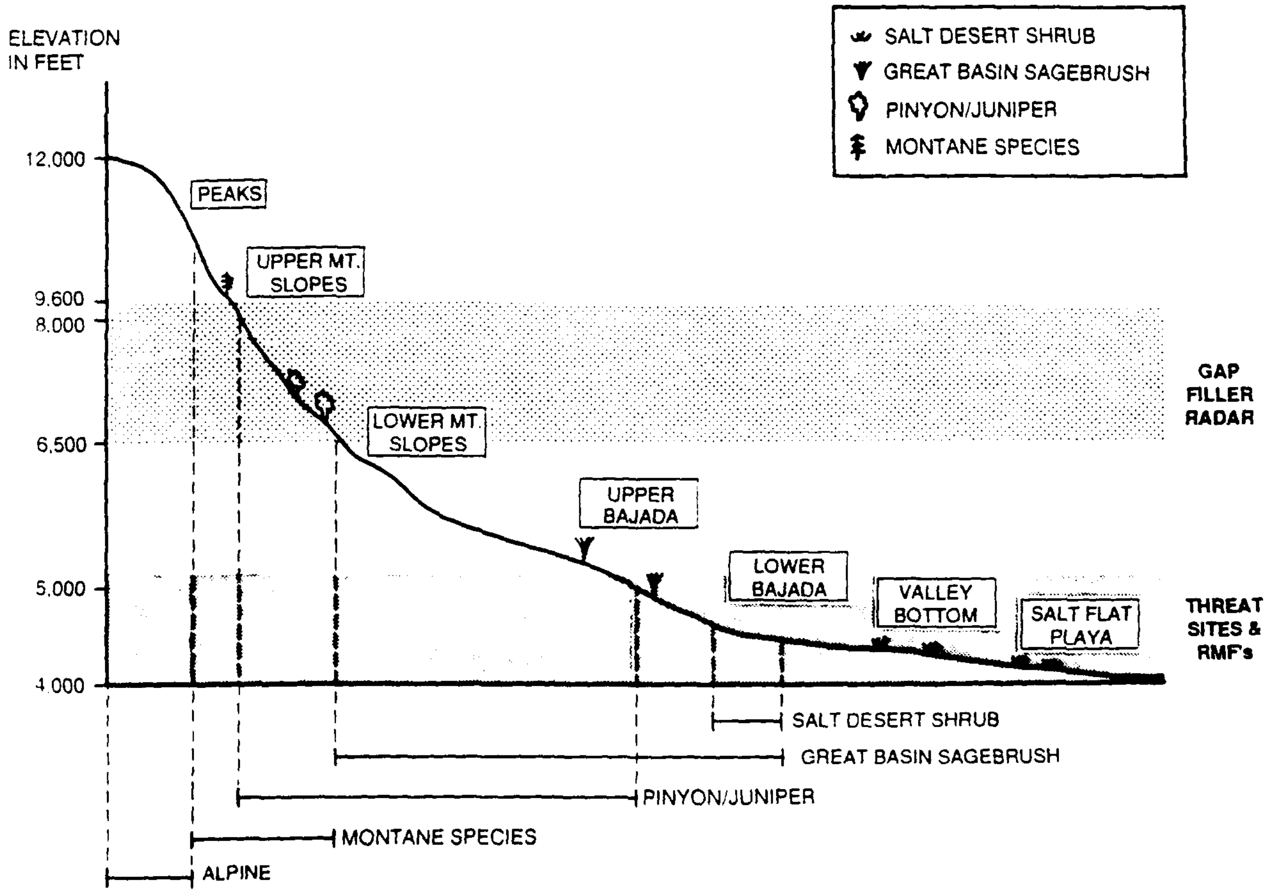

Figure 3.3-1. Vegetational changes with elevation.

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The transition is gradual from the salt-desert shrub community to the higher Great Basin sagebrush zone. The sagebrush-dominated community occurs on alluvial benches, knolls, and foothills in the area. Coarse soils, better drainage, and low salinity support both a greater density and diversity of species. In addition to sagebrushes (Artemisia sp.), other common plants include rabbitbrush (Chrysothamnus sp.), Mormon tea (Ephedra nevadensis), horsebrush (Tetradymia sp.), spiny hopsage (Grayia spinosa), and shadscale. The alkali sacaton is mixed with other species of grasses such as Indian ricegrass (Stipa hymenoides), galleta (Hilaria jamesii), and grama grasses (Bouteloua sp.). Many of these plants are heavily grazed. In disturbed areas, several nonnative weedy plant species have become abundant. Russian thistle (Salsola kali), Halogeton glomeratus, and cheatgrass (Bromus tectorum) are some of the more common of these invaders. These species are undesirable for rangeland since they are either unpalatable, toxic, or injurious to livestock. In addition, their introduction discourages desirable species from reestablishing themselves (Barbour and Billings, 1988).

At higher elevations, there is a gradual transition to a piñon-juniper zone. Sagebrush is gradually replaced by grasses and forbs, and juniper (Juniperus osteosperma) occurs in nearly pure stands, often called "juniper belts." At higher elevations, piñon pine (Pinus monophylla) enters the association, forming the piñon-juniper woodland. Eventually, at even higher elevations, the piñon replaces the juniper altogether. These woodland species are replaced at higher elevations by a montane forest community. Forest species include ponderosa pine (Pinus ponderosa), Douglas fir (Pseudotsuga menziezii), white fir (Abies concolor), Engelmann spruce (Picea engelmannii), limber pine (Pinus flexilis), and bristlecone pine (Pinus longaeva).

Above treeline, vegetation exists that is best described as alpine tundra. The plants are low-growing or prostrate, and are highly adapted to the harsh environment of cold temperatures and strong winds.

Riparian and wetland vegetation occurs along stream courses and at springs in isolated areas throughout west-central Utah. Trees generally are not found along lower elevational watercourses, but with increased elevation poplar (Populus sp.), willow (Salix sp.), and aspen (Populus tremuloides) are abundant near streams.

3.3.3 WILDLIFE

The ECTC program area provides a wide diversity of wildlife habitats ranging from alkaline basins to alpine reaches of the high mountains. The area is dominated, however, by the salt-desert shrub zone, the Great Basin sagebrush zone, and lower portions of the juniper belt. Common terrestrial animals occurring in the study area are listed in Table 3.3-1, along with the habitats in which they occur. Non-game animals include amphibians, reptiles, some mammals, and birds.

There are very few amphibians in the ECTC program area. The one most likely to be found is the Great Basin spadefoot toad (Scaphiopus intermontanus), which breeds in temporary bodies of water in sagebrush flats and piñon-juniper habitats.

Numerous reptiles, including lizards and snakes, are found in the program area. Species such as the black-collared lizard (Crotaphytus insularis), the longnose leopard lizard (Gambelia wislizenii), the Great Basin rattlesnake (Crotalus viridis lutosus), and the Great Basin gopher snake (Pituophis melanoleucus deserticola) are common at low elevations.

Table 3.3-1. Common terrestrial animals and their occurrence in habitats found in the study area.

Species	Aquatic	Riparian	Sagebrush	Shadscale Greasewood	Sandy Areas	Piñon-Juniper Woodland
AMPHIBIANS						
Frogs and Toads						
Great Basin Spadefoot _Scaphiopus intermontanus_	x	x	x			x
REPTILES						
Lizards						
Longnose leopard lizard _Gambelia wislizenii_			x	x	x	
Black-collared lizard _Crotaphytus insularis_			x	x		
Side blotched lizard _Uta stansburiana_			x	x	x	x
Desert horned lizard _Phrynosoma platyrhinos_				x	x	
Western whiptail lizard _Cnemidophorus tigris_			x	x	x	x

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Table 3.3-1. Common terrestrial animals and their occurrence in habitats found in the study area.

Species	Aquatic	Riparian	Sagebrush	Shadscale Greasewood	Sandy Areas	Piñon-Juniper Woodland
Sagebrush lizard <u>Sceloporus</u> <u>graciosus</u>			x	x		
Snakes						
Striped whipsnake <u>Masticophus</u> <u>taeniatus</u>			x	x		
Great Basin gopher snake <u>Pituophis</u> <u>melanoleucus</u> <u>deserticola</u>			x	x		x
Long-nose snake <u>Rhinocheilus</u> <u>lecontei</u>				x	x	
Spotted night-snake <u>Hypsiglena</u> <u>torquata</u>			x			
Great Basin rattlesnake <u>Crotalus</u> <u>viridis</u> <u>lutosus</u>			x	x	x	x
MAMMALS						
Bats						
California Myotis <u>Myotis</u> <u>californicus</u>				x		x
Western pipistrelle <u>Pipistrellus</u> <u>hesperus</u>				x		x

Table 3.3-1. Common terrestrial animals and their occurrence in habitats found in the study area.

Species	Aquatic	Riparian	Sagebrush	Shadscale Greasewood	Sandy Areas	Piñon-Juniper Woodland
Pallid bat Antroxous pallidus			x	x		
Big eared bat Plecotus townsendi			x			x
Big freetail bat Tadarida macrotis						x
Rodents						
Townshend's ground squirrel Spermophilus townshendii			x	x	x	
Whitetail antelope Ground squirrel Ammospermophilus leucurus				x	x	x
Valley pocket gopher Thomomys bottae			x	x		x
Little pocket mouse Perognathus longimembris			x	x	x	x
Great basin pocket mouse P. parvus			x	x		x
Ord's kangaroo rat Dipodomys ordii			x	x	x	

Table 3.3-1. Common terrestrial animals and their occurrence in habitats found in the study area.

Species	Aquatic	Riparian	Sagebrush	Shadscale Greasewood	Sandy Areas	Piñon-Juniper Woodland
Chisel-toothed kangaroo rat <u>D. microps</u>			x	x	x	
Western harvest mouse <u>Reithrodontomys megalotis</u>		x	x	x		
Deer mouse <u>Peromyscus maniculatus</u>		x	x	x		x
Canyon mouse <u>P. crinitus</u>				x		
Northern grasshopper mouse <u>Onychomys leucogaster</u>			x	x		
Sagebrush vole <u>Lagurus curtatus</u>			x			
Mountain vole <u>Microtus montanus</u>	x					
Desert woodrat <u>Neotoma lepida</u>				x		
Porcupine <u>Erethizon dorsatum</u>		x	x			x
Rabbits						
Black-tailed jackrabbit <u>Lepus californicus</u>			x	x		x

Table 3.3-1. Common terrestrial animals and their occurrence in habitats found in the study area.

Species	Aquatic	Riparian	Sagebrush	Shadscale Greasewood	Sandy Areas	Piñon-Juniper Woodland
Desert Cottontail <u>Sylvilagus audubonI</u>		x	x	x	x	x
Carnivores						
Badger <u>Taxidea taxus</u>			x	x		
Striped skunk <u>Mephitis mephitis</u>		x	x	x		x
Coyote <u>Canis latrans</u>			x	x	x	x
Kit fox <u>Vulpes macrotis</u>			x	x	x	x
Bobcat <u>Lynx rufus</u>		x	x	x		x
Mountain lion <u>Felis concolor</u>						x

Source: Stebbins, 1966; Burt and Grossenheider, 1976; Hall and Kelson, 1959; McMahon, 1986. Table modified from U.S. Air Force; Deployment Area Selection and Land Withdrawal/Acquisition, Draft Envirnomental Impact Statement.

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Mammals in the program area are highly adapted to the vegetative zones in the area. Bats such as the California myotis (Myotis californicus) and the western pipistrelle (Pipistrellus hesperus) are frequently found foraging for insects over water. The bats often roost in hollow trees, rock crevices, caves, mine tunnels, and old buildings.

Rodents are important members of the Great Basin ecosystem. Because of their large numbers and widespread distribution, they are important in the food chain both as predators of insects and as prey for many carnivores in the region. Some of the more common rodents in lower elevations are the chisel-toothed kangaroo rat (Dipodomys microps), the desert woodrat (Neotoma lepida), and Townshend's ground squirrel (Spermophilus townshendii).

The black-tailed jack rabbit (Lepus californicus) is very common throughout western Utah. Fluctuations in jack rabbit populations affect plant life because jack rabbits are herbivores. In addition to being hunted by many carnivores, jack rabbits provide carrion for vultures and coyotes.

The coyote occupies a wide range of habitats in w stern Utah. Being an omnivore and a scavenger, the coyote is an opportunist by nature. The coyote is an important component in the ecosystem because it helps keep the rodent population in check. It also has some distinction as being a fur-bearing mammal, as well as a predator of livestock.

Big-game animals include the pronghorn antelope (Antilocapra americana), the muledeer (Odocoileus hemionus), and the Rocky Mountain bighorn sheep (Ovis canadensis canadensis).

Pronghorn occur throughout the prairies of central and western North America. In the Great Basin they inhabit valleys, usually

between 4,000 and 6,000 ft. Muledeer are also widely distributed, and occur primarily in the mountains in the program area. Bighorn sheep have been reintroduced into the area. These species and their habitats are discussed further in the next section. Small-game animals include the cottontail rabbit, the mountain lion, and the chukar partridge. The mountain lion is usually found in the foothills and mountains with its prey, the muledeer. It is rarely seen below 5,000 ft. Chukar, a nonnative species of partridge introduced as a game bird, inhabit the mountain ranges and foothills at elevations of approximately 4,900 to 6,500 ft.

Many birds utilize the area either year-round or as migrants. Smaller birds characteristic of the study area include the horned lark (Eremophila alpestris), the sage thrasher (Oreoscoptes montanus), the Brewer's sparrow (Spizella breweri), the canyon wren (Catherpes mexicanus), and the sage sparrow (Amphispiza belli). Raptors, such as owls, hawks, and falcons, are found throughout the region. They include the turkey vulture (Cathartes aura), the red-tailed hawk (Buteo jamaicensis), the ferruginous hawk (Buteo regalis), the golden eagle (Aquila chrysaetos), the american kestrel (Falco sparverius), the great horned owl (Bubo virginianus), and the burrowing owl (Athene cunicularia). These birds prey on rodents, rabbits, smaller birds, and carrion. Major raptor migration corridors are found on the eastern and western edges of the Great Salt Lake Desert, which is generally avoided by migrating raptors. The most important waterfowl migration corridor and part of the Pacific Flyway extends from Fish Springs National Wildlife Refuge to the Great Salt Lake. Common birds of the study area are listed in Table 3.3-2.

Table 3.3-2. Common birds and their occurrence in habitats found in the ECTC study area.

Species	Aquatic	Riparian	Sagebrush	Shadscale and Greasewood	Piñon Juniper Woodland
Raptors (Falconiformes)					
Turkey vulture *Cathartes aura*		S	S	S	S
Cooper's Hawk *Accipiter cooperii*	P				
Red-tailed hawk *Buteo jamaicensis*		P	P		P
Rough-legged hawk *Buteo lagopus*				W	
Ferruginous hawk *Buteo regalis*				ST	
Golden eagle *Aquila chrysaetos*	P	P	P	P	P
Northern harrier *Circus cyaneus*	P	P	P	P	P
American kestrel *Falco sparvarius*		P	P	P	P

Key: P = Permanent resident
S = Summer only
T = Spring/Fall transient
W = Winter only

Table 3.3-2. Common birds and their occurrence in habitats found in the ECTC study area.

Species	Aquatic	Riparian	Sagebrush	Shadscale and Greasewood	Piñon Juniper Woodland
Doves (Columbidae)					
Mourning dove <u>Zeralda</u> <u>macroura</u>	ST	ST	ST		ST
Owls (Strigidae)					
Great horned owl <u>Bubo</u> <u>virginianus</u>		P			
Burrowing Owl <u>Athene</u> <u>cunicularia</u>			P	P	
Nightjars (Caprimulgidae)					
Poorwill <u>Phalaenoptilus</u> <u>nuttalli</u>		S		S	
Common nighthawk <u>Chordeiles</u> <u>minor</u>	ST	ST	ST		ST
Woodpeckers (Picidae)					
Flicker <u>Colaptes</u> <u>auratus</u>		P	P		P

Table 3.3-2. Common birds and their occurrence in habitats found in the ECTC study area.

Species	Aquatic	Riparian	Sagebrush	Shadscale and Greasewood	Piñon Juniper Woodland
Flycatchers (Tyrannidae)					
Western kingbird <u>Tyrannus verticalis</u>		ST		ST	ST
Say's phoebe <u>Sayornis saya</u>		S			S
Gray flycatcher <u>Empidonax wrightii</u>			ST		ST
Larks (Alaudidae)					
Horned lark <u>Eremophila alpestris</u>			P	P	
Swallows (Hirundinidae)					
Violet-green swallow <u>Tachycineta thalassina</u>	ST	ST	ST	ST	ST
Crows (Corvidae)					
Black-billed magpie <u>Pica pica</u>		P	P		P

Table 3.3-2. Common birds and their occurrence in habitats found in the ECTC study area.

Species	Aquatic	Riparian	Sagebrush	Shadscale and Greasewood	Piñon Juniper Woodland
Wrens (Troglodytidae)					
Canyon wren <u>Catherpes</u> <u>mexicanus</u>			P		P
Thrashers (Mimidae)					
Sage thrasher <u>Oreosoptes</u> <u>montanus</u>			S		S
Shrikes (Laniidae)					
Loggerhead shrike <u>Lanius</u> ltudovicianus				P	
Blackbirds (Icteridae)					
Brown-headed cowbird <u>Molothrus</u> <u>ater</u>		ST			
Sparrows and Finches (Fringillidae)					
House finch <u>Carpodacus</u> <u>mexicanus</u>		P	P		

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Table 3.3-2. Common birds and their occurrence in habitats found in the ECTC study area.

Species	Aquatic	Riparian	Sagebrush	Shadscale and Greasewood	Piñon Juniper Woodland
Black-throated sparrow <u>Amphispiza bilineata</u>			S	S	
Sage sparrow <u>Amphispiza belli</u>			S	S	S
Dark-eyed (Oregon) junco <u>Junco hyemalis</u>		TW	TW		TW
Brewer's sparrow <u>Spizella breweri</u>			ST		S

Table modified from U.S. Air Force; Deployment Area Selection and Land Withdrawal/Acquisition Draft Environmental Impact Statement.

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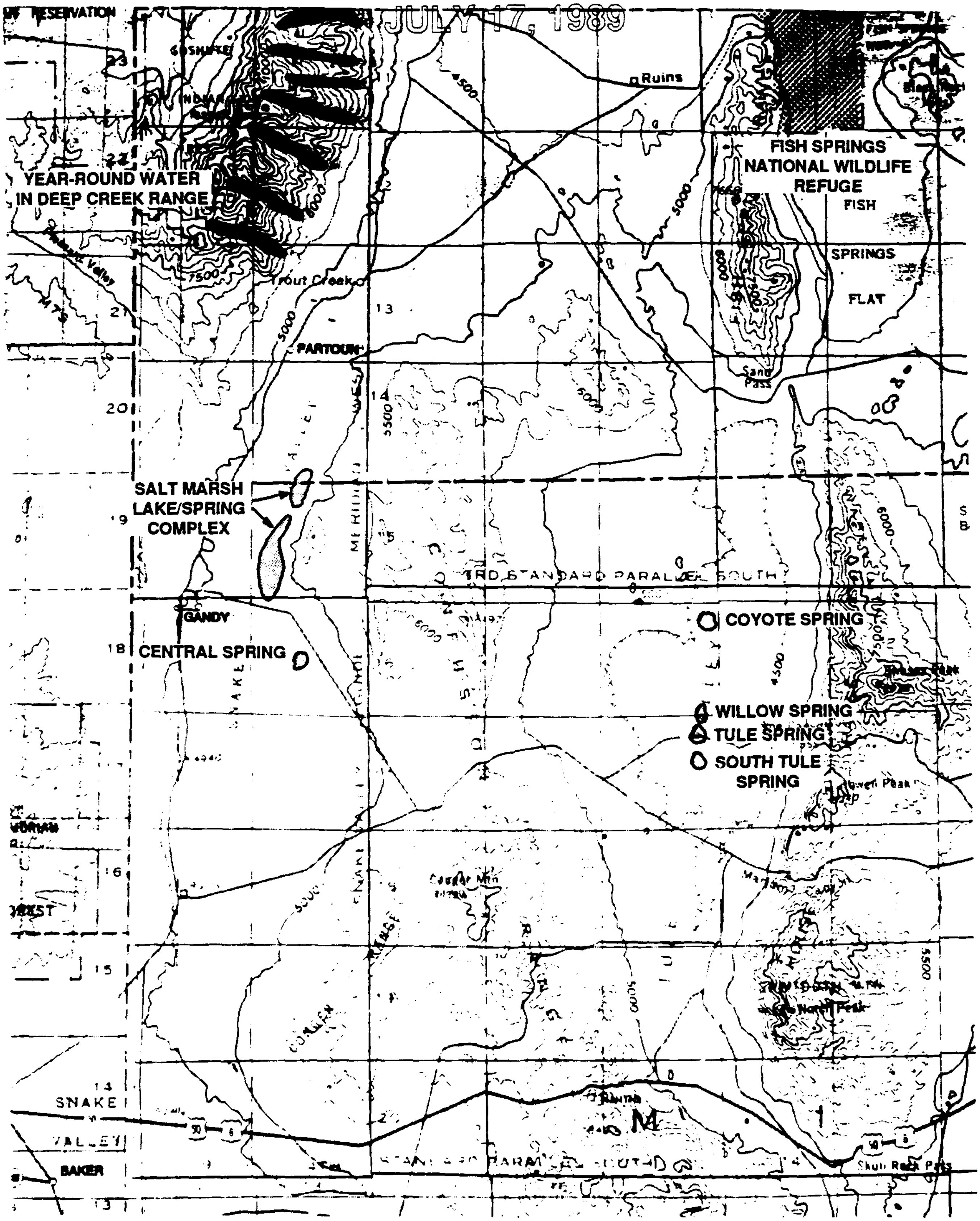
3.3.4 SENSITIVE AND UNIQUE WILDLIFE HABITATS

3.3.4.1 Aquatic Habitat

At lower elevations, animals are concentrated around a few scattered springs that provide water and cover. These areas provide habitat for many candidate endangered species (discussed below). In Tule Valley, Coyote, Willow, Tule, and South Tule springs provide habitat for the least chub, a fish species that is a candidate for Federal listing as an endangered species. Substantial populations of migratory birds use Fish Springs National Wildlife Refuge, located in the north end of Whirlwind Valley. In Snake Valley, Central Spring, and the Salt Marsh Lake and Spring complex provide habitat for the least chub. Year-round water is also available in drainages along the east side of the Deep Creek Range. Figure 3.3-2 shows the locations of important aquatic habitat in the program area.

Fish Springs National Wildlife Refuge is a migratory stopover on the Pacific Flyway, which is the major migration route for migratory waterfowl and shorebirds in the western United States. The refuge consists of 18,000 acres of wetlands and mudflats fed by five free-flowing saline springs that produce about 40 cubic feet of water per second. The water levels in ponds and marsh units are managed seasonally for the estimated 20,000 to 30,000 waterfowl and shorebirds that visit the area annually. Peregrine falcons and bald eagles, both Federally protected as endangered species, have been sighted here, and a number of birds that are candidates for Federal listing as endangered species are also seen here regularly (e.g., western snowy plover, long-billed curlew, and white-faced ibis). Some nesting occurs on the refuge. Resident and migratory birds feed on aquatic vegetation and invertebrates, and some fly to nearby ranches to graze. Hunting is allowed in



Source: BLM, 1986a.

Figure 3.3-2. Important aquatic habitat in the ECTC project area.

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seven marsh units. Approximately 1,000 to 1,600 waterfowl hunters visit the refuge each year.

3.3.4.2 Critical muledeer habitat

Critical value habitat, as defined by the Utah Division of Wildlife Resources (Schwinn, 1989; Holden, 1989), is "...a sensitive use area necessary to sustain the existence or introduction of one or more species of historic or existing high interest wildlife during critical periods of their life cycle." These habitats are limited in size and distribution (Holden, 1989).

High priority value habitats are "...intensive use areas necessary to sustain the existence or introduction of one or more species of historic or existing high interest wildlife during critical periods of their life cycle." (Schwinn, 1989.)

Muledeer occur in the mountains and foothills in the project area year round (Figures 3.3-3a and b). Higher elevations provide high-priority summer range. Springs and seeps throughout the area are important watering localities and are considered to be a limiting factor to muledeer distribution. The Bureau of Land Management (BLM) has identified these watering areas as critical muledeer areas, and defines them as the area within a 0.25-mile radius of each watering hole (Pierce, 1989). High-priority winter range is located on the lower slopes and foothills of the mountains, and critical winter range is found in the Deep Creek Mountains. Permanent streams flowing from the Deep Creek Mountains support riparian vegetation, which is considered critical fawning habitat. The House Range between Tule and Whirlwind valleys contains extensive summer and winter range. The Little Drum Mountains on the east side of Whirlwind Valley also contain high priority winter range. Several important migration corridors are also found in and between the mountain ranges.

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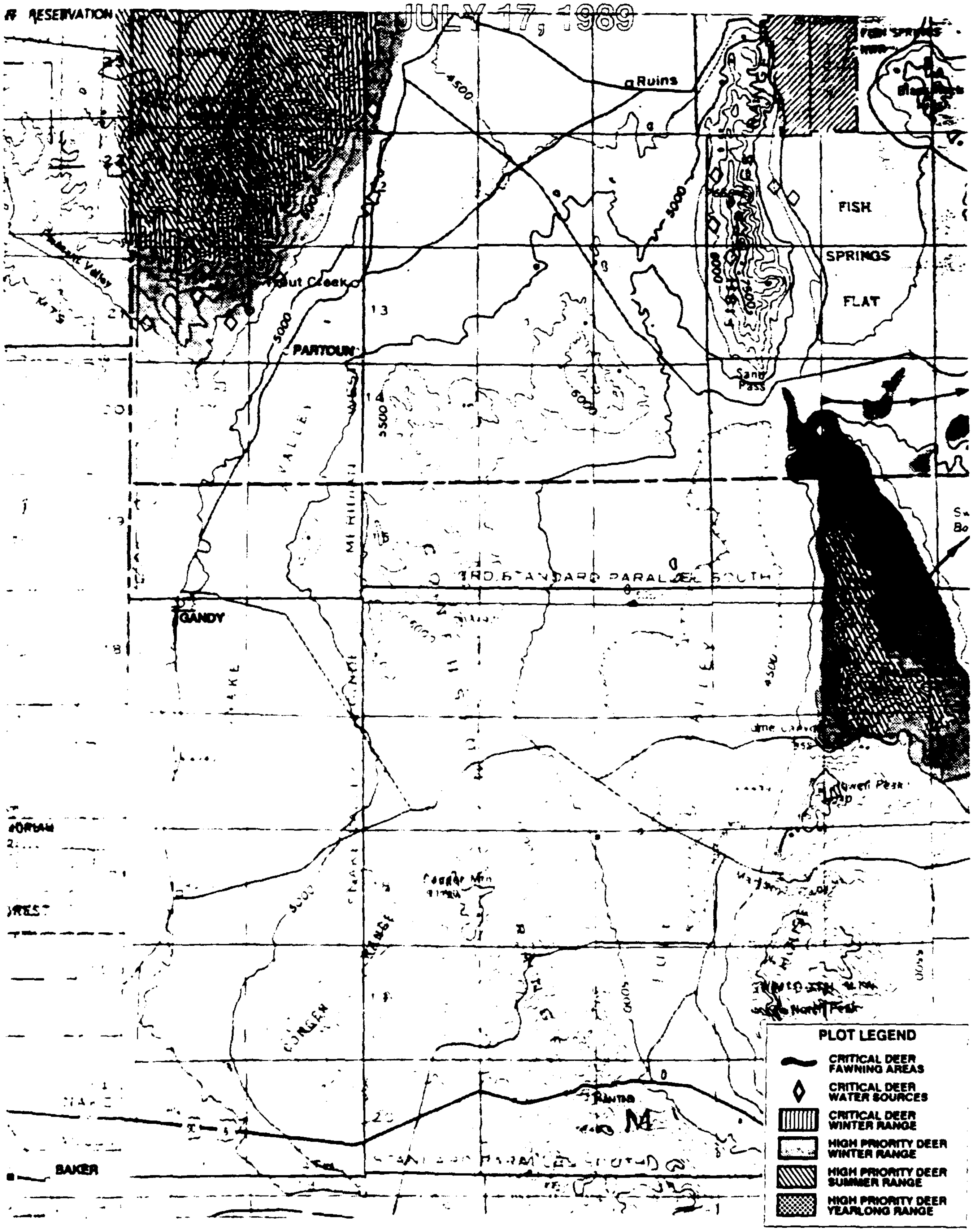

Figure 3.3-3a. Critcal muledeer habitat.

Source: BLM, 1987a; and unpublished BLM data.

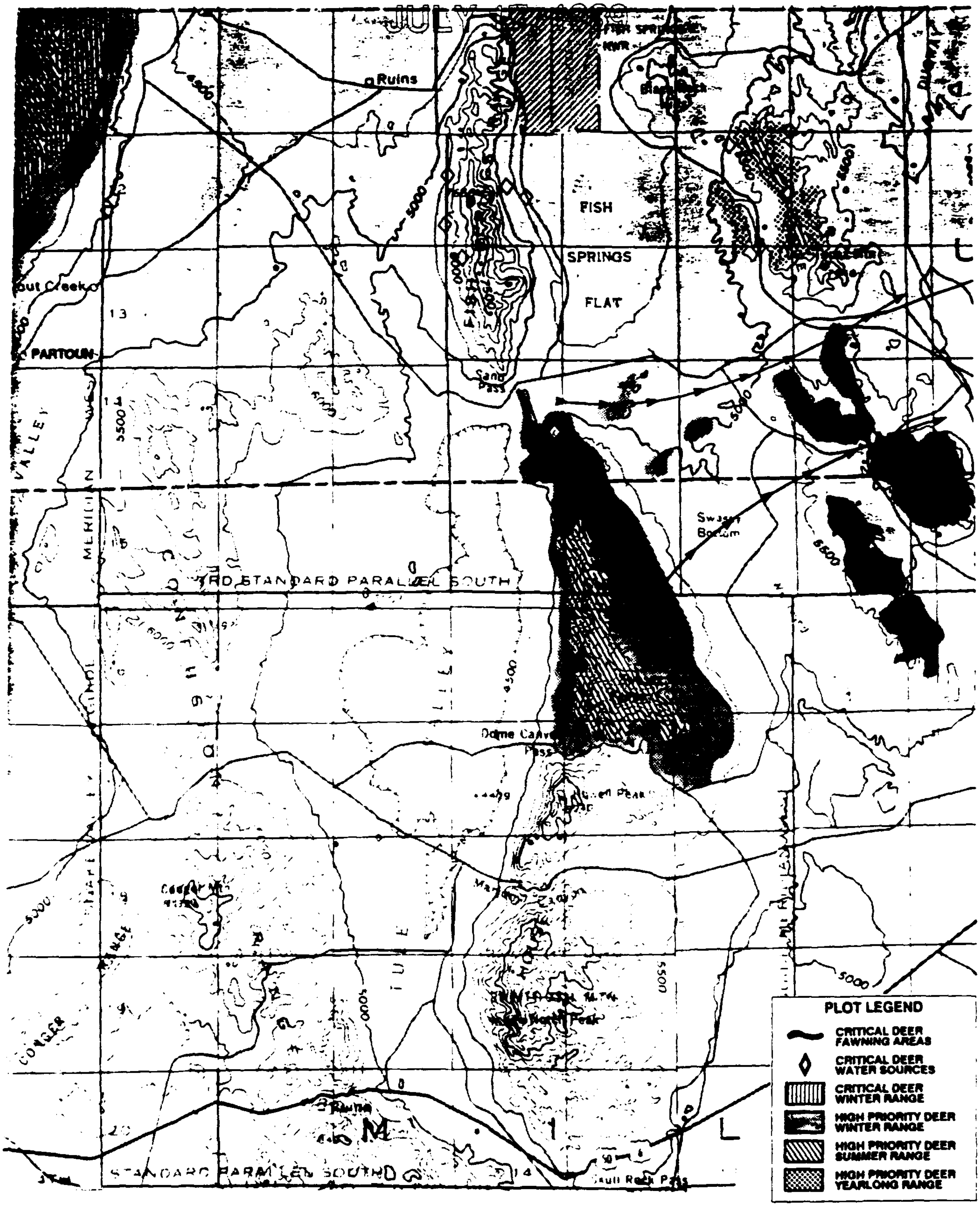

Figure 3.3-3b. Critical muledeer habitat (continued).

Source: BLM, 1987a; and unpublished BLM data.

3.3.4.3 Critical antelope habitat

Pronghorn antelope range throughout most of the ECTC program area, and much of the area contains high priority value habitat as defined above. Generally, foothills that are covered with black sagebrush (Artemesia nova) provide critical antelope habitat (BLM, 1987a; Edmonds, 1989). Watering sites and other watering areas within valleys are considered by the Utah Division of Wildlife Resources to be critical value areas. Preferred habitat, defined by the BLM as habitat capable of supporting 3 antelope/sq. mile, is also present in the study area, as is marginal habitat, defined by the BLM as habitat capable of supporting 1 antelope/sq. mile (BLM, unpublished data).

Antelope habitat and watering areas are shown in Figures 3.3-4a and b. Tule, Snake, and Whirlwind valleys all contain high priority value habitat, but Tule Valley contains the least amount. Snake Valley has the largest number of critical value water areas and sites. Fencing is not compatible with antelope, so the valleys are virtually unfenced.

3.3.4.4 Rocky Mountain bighorn sheep reintroduction area

In 1984, the Utah Division of Wildlife Resources began a reintroduction program of Rocky Mountain bighorn sheep (Ovis canadensis canadensis) into its historic range of the Deep Creek Mountains (BLM, 1987b) on the western edge of the program area. The general boundaries of the reintroduction area are shown in Figure 3.3-5. This program is a high-visibility program that is widely supported.

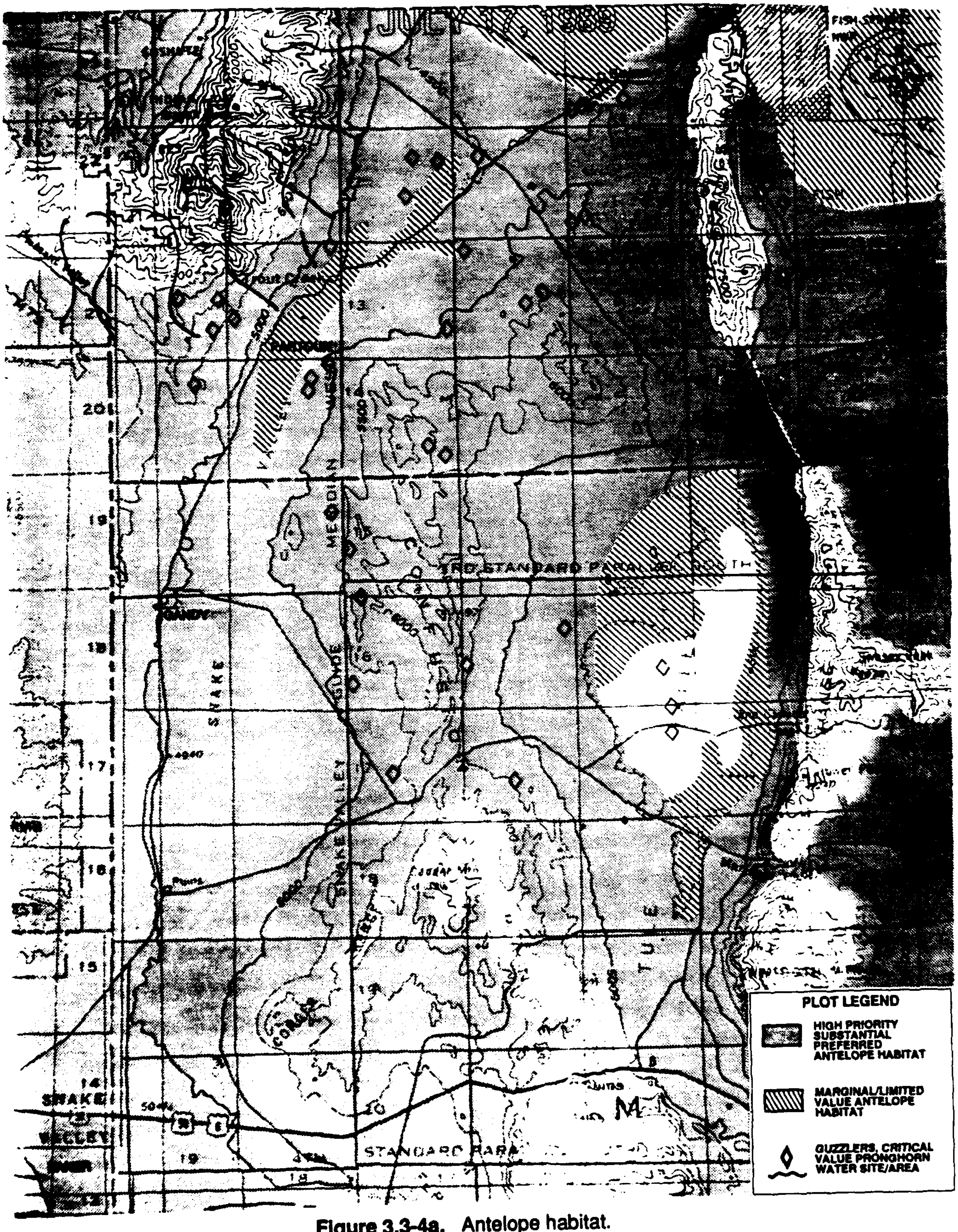

Figure 3.3-4a. Antelope habitat.

Source: Unpublished data from the Utah BLM and the Utah Division of Wildlife Resources.

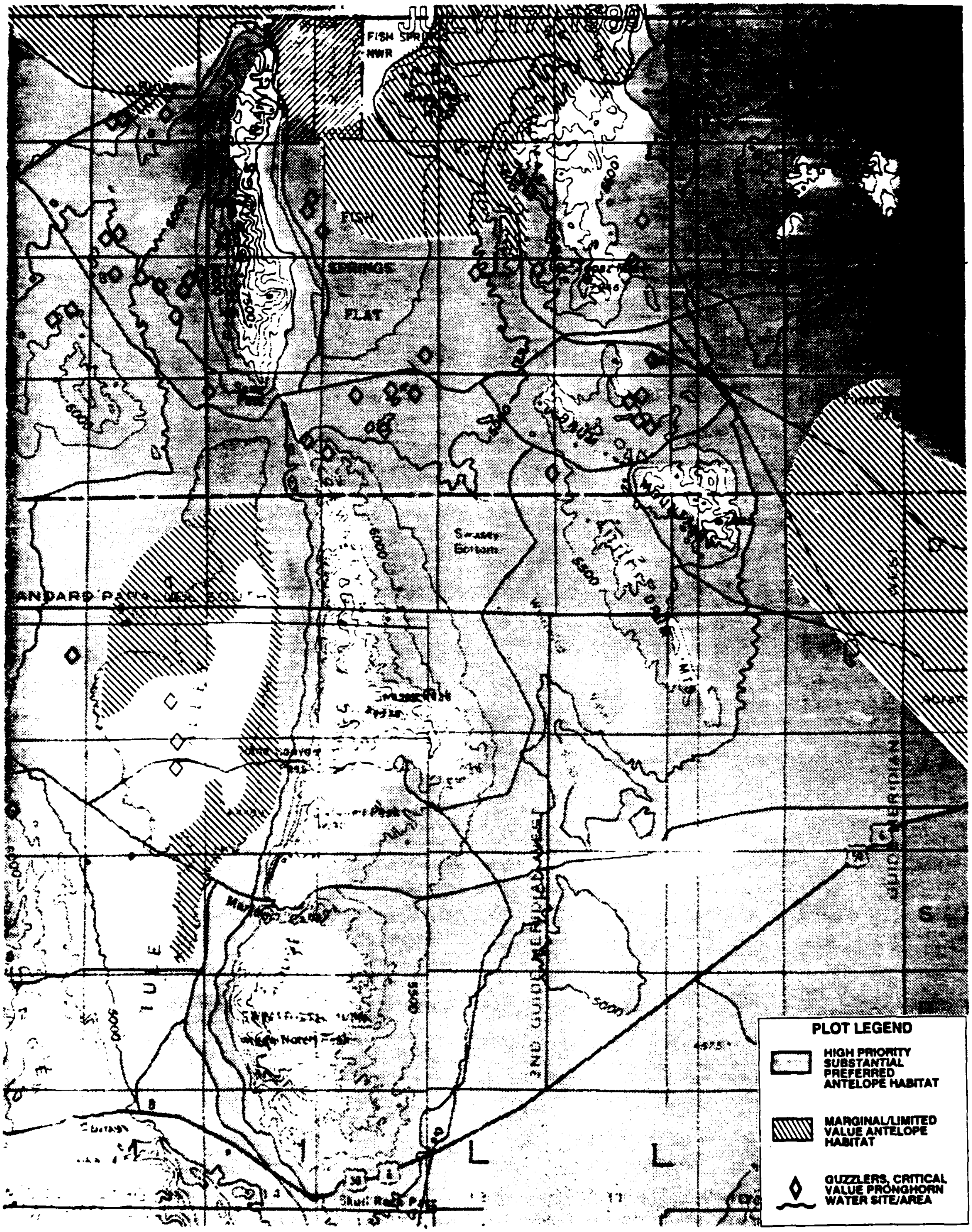

Figure 3.3-4b. Antelope habitat (continued). Source: Unpublished data from the Utah BLM and the Utah Division of Wildlife Resources.

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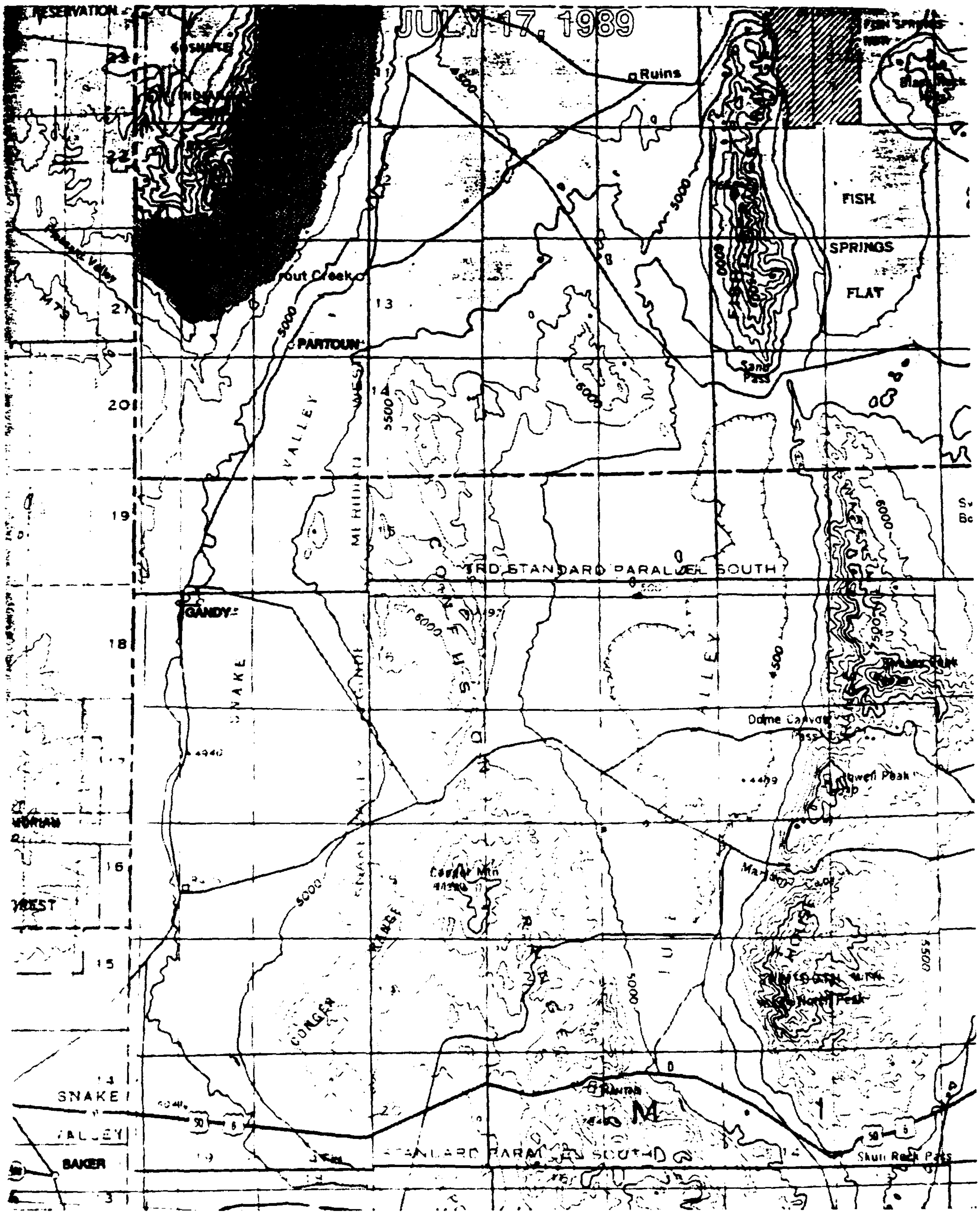

Figure 3.3-5. Rocky Mountain bighorn sheep reintroduction area.

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3.3.4.5 Critical wild horse habitat

Critical habitat for wild horses is defined by the BLM as "those areas that provide three basic life requirements of food, water and shelter (BLM, 1986a)." Fencing is not compatible with wild horse populations.

Several herds of wild horses roam within the program area, primarily in the Confusion and House ranges. These herds are not confined to topographic or vegetational boundaries, and thus migrate from mountain range to mountain range. Critical wild horse habitat is shown in Figure 3.3-6.

3.3.4.6 Crucial raptor nesting habitat

Crucial raptor nesting habitat is defined as areas within a 0.25-mile radius of all active and inactive nests (BLM, 1987b). The entire program area is utilized year-round by raptors or birds of prey, and Snake Valley is one of the migratory routes and wintering areas for the bald eagle. Ledger Canyon in the Confusion Range is designated a crucial raptor nesting area. There are also scattered nesting sites in the study areas, primarily confined to mid-to-upper elevations. Crucial raptor nesting habitat is shown in Figure 3.3-6.

3.3.5 PROTECTED SPECIES

For the purpose of this discussion, the term "protected species" applies to threatened and endangered or candidate species that are included on lists under the Endangered Species Act of 1973 (ESA). The ESA, as amended, requires each Federal agency to ensure that any action it authorizes, funds, or carries out does not jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of their critical

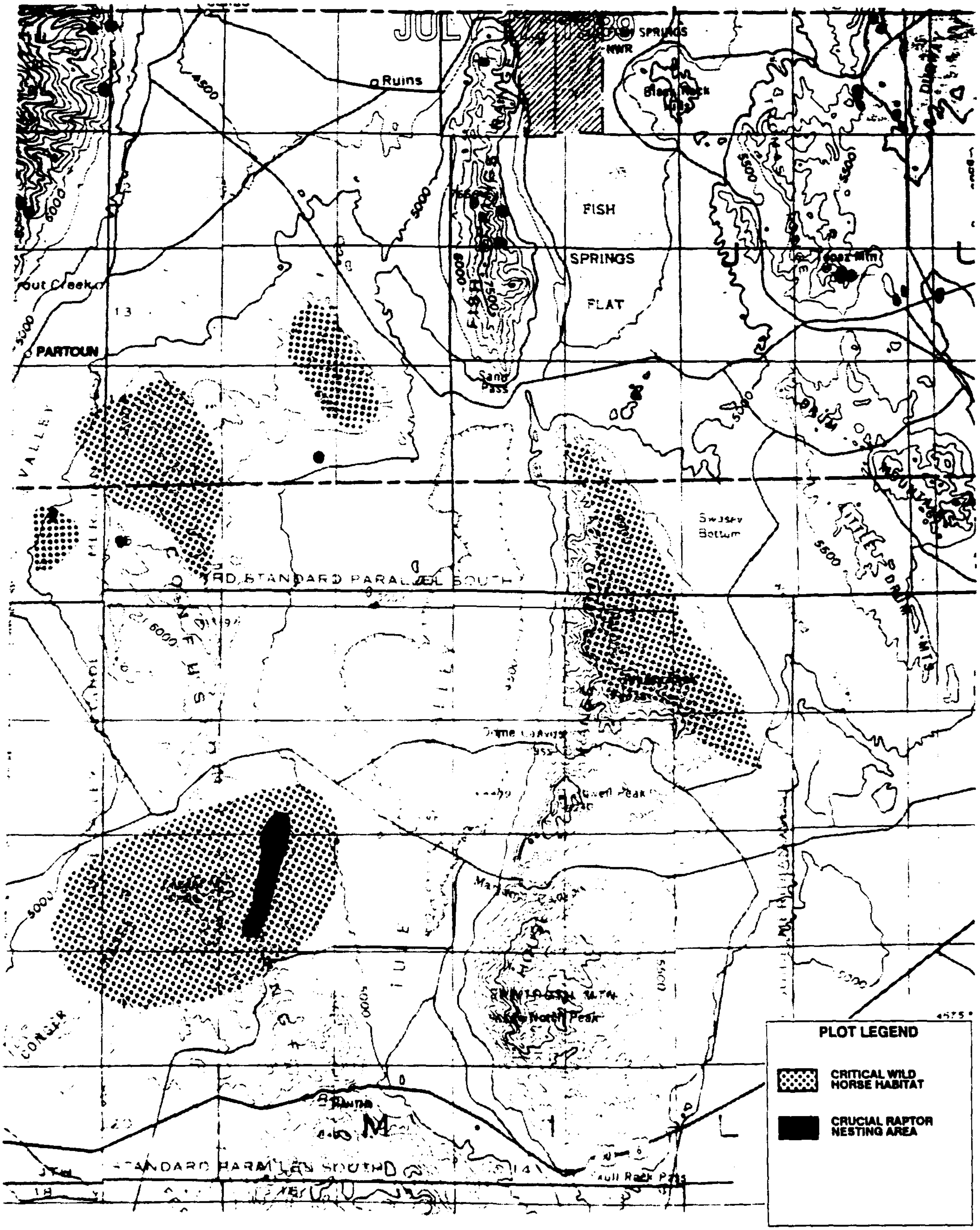

Figure 3.3-6. Critical wild horse habitat and crucial raptor nesting areas.

Source: BLM, 1987a, 1987b, and unpublished data from the Utah Division of Wildlife Resources.

habitat. Candidate species, while receiving no protection under the ESA, are taxa that are being considered for listing as either threatened or endangered. Candidate species are divided into two groups. Category 1 candidate species are those for which the USFWS has substantial information on file to support the proposal to list the species as either threatened or endangered. Category 2 species are those for which the USFWS has information that indicates listing is appropriate, but for which data on biological vulnerability are not available to support or refute proposals for listing.

The Air Force has begun informal consultation with the USFWS, as required by Section 7 of the ESA, and has contacted the Reno and Salt Lake City offices for lists of species. Two species that are Federally listed as endangered, the peregrine falcon and the bald eagle, occur within the program area. Twenty-one candidate species (four birds, four mammals, two fish, one invertebrate, and ten plants) were identified by the USFWS as occurring in the program area. These species are listed in Table 3.3-3, along with their status, known distribution, and habitat information. Brief discussions of the two endangered species are provided below.

The peregrine falcon (Falco peregrinus) breeds in Alaska, Canada, and scattered areas in the west, and winters to the south (USFWS, 1982). It nests on cliffs and in caves near lakes, rivers, and marshes, which provide habitat for waterfowl, one of its food sources.

In the study area, the peregrine falcon has been seen at various locations throughout the program area. These areas include the Great Salt Lake, Skull Valley, Snake Valley, Fish Springs National Wildlife Refuge, and the Goshute Mountains. Hack towers on the eastern and southeastern perimeter of the Great Salt Lake are utilized by this species, and a historical nesting site is located

Table 3.3-3. Federally listed endangered or threatened species and candidate species in the project area.

Species	Known Distribution	Habitat	Occurrence in study area
		ENDANGERED	
Bald eagle <u>Haliaeetus leucocephalus</u>	Alaska and Canada to Southern U.S. (NAS, 1983)	Closely associated with large bodies of water; marshy areas where they feed on waterfowl and carp (Benton, 1989).	UTTR is a migratory route and wintering area. There is a roost-tree in Skull Valley at the Orr Ranch near Dugway (Benton, 1989) and sighting in Snake Valley (Edmonds, 1989). Records of sightings at Fish Springs National Wildlife Refuge (1985-1988) indicate 4-8 birds utilize area in late fall and early spring. Raptor counts in Goshute Mountains indicate 10 birds/year roost and travel through the area in the fall (Hoffman, 1989).
Peregrine Falcon <u>Falco peregrinus</u>	From Alaska S. along the Rockies, the E. and W. coasts, and S. Texas. (NAS, 1983)	Feed on medium size birds such as pigeons, and waterfowl. Nest in cliffs, caves, on ledges, and some man-made structures in large ci-	Utilize hack towers on E. and S.E. perimeter of Great Salt Lake. One tower is located at Timpie Springs Waterfowl Management Area located at the N. end of Skull Valley. Two active aeries on periphery of *ECTC*

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Table 3.3-3. Federally listed *endangered or threatened* species and candidate species in the project area.

Species	Known Distribution	Habitat	Occurrence in study area
		ENDANGERED	
Peregrine Falcon Falco Peregrinus (Continued)		ties; near lakes, rivers, marshes and other bodies of water where prey is abundant.	study area. An aerie *occurs* in downtown *Salt Lake City* (Benton, 1989). An historic nesting site is at Blue Lake south of Wendover (Benton, 1989) and there have been sightings in Snake Valley in recent years (Edmonds, R. 1989). Sightings at Fish Springs National Wildlife Refuge in May 1986, mid-summer 1987, and early winter 1987 (Savery, J., 1989). Raptor counts done in Goshute Mountains indicate 10-12 peregrine falcons migrate through each fall (Hoffman, 1989).

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Table 3.3-3. Federally listed endangered or threatened species and candidate species in the project area.

Species	Known Distribution	Habitat	Occurrence in study area
		CATEGORY 1 (Candidate for federal listing because present information indicates the species is appropriate for listing as threatened or endangered.)	
Bonneville Trout <u>Salmo clarki utah</u>	Found only in headwaters of Trout Creek in the Deep Creek Mountains (Lamarra et al., 1980).		Trout Creek in the Deep Creek Mountains.
Compact catseye <u>Cryptantha compacta</u>	Millard Co., UT (On Desert Research Experimental Station) Tooele Co., UT	Sevy, dolomite formation, gravelly loam, open slopes and ridges, and outcrops covered with shallow soil layer; desert shrub and grassland community with <u>Eriogonum eremicum</u>, <u>Sphaeralcea caespitosa</u>, <u>Penstemon nanus</u> and other restricted species.	Possibly in area of gapfiller radar, STA, and ITA sites and in all valleys.

Table 3.3-3. Federally listed endangered or threatened species and candidate species in the project area.

Species	Known Distribution	Habitat	Occurrence in study area
Sand-loving buckwheat <u>Eriogonum ammophilum</u>	Millard Co., UT	Quaternary alluvium, sandy soil, desert shrub community.	Possibly in area near gapfiller radar access roads, or in areas of sand dunes.
Sunnyside green gentian <u>Frasera gypsicola</u>	Nye Co., NV Millard Co., UT	NV: Gypsum flats along the lower waters of the White River in sandy alluvial soils; sometimes arising from mounds of <u>Lepidium nanum</u>. UT: North of Garrison in greasewood and shadscale bottoms.	Possibly at Snake Valley RMF site.
Frisco clover <u>Trifolium andersonii friscanum</u>	San Francisco Mountains, Tunnel Springs Mountains Beaver Co., UT.	Rocky outcrops with shadscale and bud-sage in scattered piñon-juniper.	Possibly at Tunnel Mountain and Frisco Peak gapfiller radar sites.

Table 3.3-3. Federally listed endangered or threatened species and candidate species in the project area.

Species	Known Distribution	Habitat	Occurrence in study area
CATEGORY 2 (Candidate for federal listing. Possibly appropriate for listing as threatened or endangered, but information insufficient at this time.)			
Spotted bat <u>Euderma maculatum</u>	UT: in Kane, Garfield, Salt Lake Counties (Durrant, 1952), *Iron* and Washington counties (Fenton et al., 1983 as stated by Benton, 1989).	Desert sites with open water.	Possible occurrence in study area; no data available.
Bonneville pocket *gopher* <u>Thomomys unbrinus bonnevillei</u>	North Spring at *Fish* Springs National Wild-life Refuge (Durrant, 1956).	Dry peat area near North *Spring*.	Originally collected in 1946 and found to be extant in 1964 (Savery, 1989).

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Table 3.3-3. Federally listed endangered or threatened species and candidate species in the project area.

Species	Known Distribution	Habitat	Occurrence in study area
Swasey Spring pocket gopher <u>Thomomys umbrinus sevieri</u>	Swasey Spring area	Elevations above the highest water level of Pleistocene Lake Bonneville (Durrant, 1956).	Swasey Spring is in the House Range.
Skull Valley pocket gopher <u>Thomomys umbrinus robustus</u>	Orr's Ranch	Spring Areas	Orr's Ranch at southern end of Skull Valley, near Dugway.
Western snowy plover <u>Charadrius alexandrinus nivosus</u>	Worldwide. In NA, a resident on Pacific and Gulf coasts. Breeds in interior of OR,CA,NV,UT, NM,KS,OK, and TX (NAS, 1983).	Lives/breeds (Ap-Aug) on alkali and sand flats near water (Benton, 1989 and Halpin, 1989) where it feeds on brine flies (Halpin, 1989).	Bird count along Great Salt Lake in June 1988 by Utah Div. of Wildlife Resources turned up 444 adults. Sporadic sightings in Tule Valley. Thirteen breeding pair were noted at Fish Springs in 1988 (Engler, 1989). Populations at Fish Springs vary from year to year from 62-100 birds.

Table 3.3-3. Federally listed endangered or threatened species and candidate species in the project area.

Species	Known Distribution	Habitat	Occurrence in study area
Long-billed curlew *Numenius americanus*	Occurs from S. British Columbia, Manitoba and south to CA, southern AZ, southern NM, TX and LA. SC to FL south to Mexico (NAS, 1983).	Great plains grasslands, wetlands, marshes, mud and sandflats, and shorelines (NAS, 1983).	Ubiquitous in marshy areas. Fish Springs National Wildlife Refuge has a spring population of 30-40 birds. During spring 1989, 60 birds were counted east of the refuge in a small area (Engler, 1989).
White-faced ibis *Pleagadis chihi*	Breeds from OR to MN. S. to CA, UT and NE as well as Gulf coast.	Marshes	It occurs in and around wetlands in the ECTC study area (Fish Springs National Wildlife Refuge).
Ferruginous hawk *Buteo regalis*	Great plains and intermountain regions of W. Canada and U.S.	Nests on ground, in trees, along drainages and in powerlines and towers.	Its broad range includes the ECTC study area.

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Table 3.3-3. Federally listed endangered or threatened species and candidate species in the project area.

Species	Known Distribution	Habitat	Occurrence in study area
Least chub <u>Iotichthys phlegethontis</u>	Springs and marshes in western UT.	Clear springs, streams and marshes with abundant vegetation over clay, mud or organic debris (Williams, 1983).	Salt Marsh Lake/Spring complex, Coyote Spring, Tule Spring, South Tule Spring, Central Spring.
Utah physa snail <u>Physella utahensis</u>	A remnant of a population that used to inhabit Pleistocene Lake Bonneville, it is known from Utah Lake, Fish Springs and a spring near Junction, UT (Russell, 1971).	Marshy shoreline in spring fed habitat.	Known habitats include Fish Springs; could inhabit other spring areas in Bonneville basin.

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Table 3.3-3. Federally listed endangered or threatened species and candidate species in the project area.

Species	Known Distribution	Habitat	Occurrence in study area
Currant milkvetch <u>Astragalus</u> <u>uncialis</u>	Nye Co., NV Millard Co., UT, north of Sevier Lake.	Bare knoll of stiff alkaline clay derived from limestone. Ancient lake terraces.	Possibly in Whirlwind Valley.
Cow-plaster buckwheat <u>Eriogonum</u> <u>soredium</u>	Near Frisco in Beaver Co., UT	Sagebrush and juniper communities on out-croppings of white limestone.	Possibly lower elevations of gapfiller access roads.
Ostler peppergrass <u>Lepidium</u> <u>ostleri</u>	Endemic near Frisco, Beaver Co., UT	Crevices of limestone outcrops in pinion-juniper.	Possibly mid-elevation gapfiller radar access roads.
Tunnel Springs beard-tongue <u>Penstemon</u> <u>concinnus</u>	Beaver and Millard cos., UT	Sevy dolomite formations, gravelly soil, piñon-juniper woodland.	Possibly Tunnel Mountain gapfiller radar site.

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Table 3.3-3. Federally listed endangered or threatened species and candidate species in the project area.

Species	Known Distribution	Habitat	Occurrence in study area
Spiranthese diluvialis	Scattered localities throughout western U.S.	Lower elevations in wet meadows along permanent streams, springs and lakes.	Springs near Callao, possibly in other wet areas of Snake Valley (England, 1989).
House range primrose *Primula domensis*	House Range	Crevices in limestone at elevations of 8400-9000 ft.	House Range

Category 1 = candidate for Federal listing (present information indicates appropriate for listing as threatened or endangered).

Category 2 = candidate for Federal listing (possibly appropriate for listing as threatened or endangered, but information insufficient at this time).

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at Blue Lake, south of Wendover. An active aerie is located in downtown Salt Lake City.

The bald eagle (Haliaeetus leucocephalus) has been a protected species in the United States since the establishment of the Bald Eagle Protection Act in 1940. Its center of abundance is primarily in the northern United States, but large concentrations are also found in Florida, California, Louisiana, and Texas (USFWS, 1982). The birds migrate throughout North America. Habitat for the bald eagle is usually associated with large bodies of water that provide eagles with an abundant source of food, which is primarily fish. Bald eagles winter in the study area. There is one known roost tree in Skull Valley (near Dugway), and others in the Goshute Mountains, just west of the study area.

Other agencies, such as the Utah Division of Wildlife Resources and the Nevada Department of Wildlife, were also contacted for this analysis. The State of Utah does not have an official endangered species program. The State of Nevada does, but no species that would potentially be affected by the ECTC program have been identified.

Field surveys for candidate plant species occurring in the vicinity of fiscal year 1990 construction sites are currently ongoing. Surveys were performed in early May 1989 and again in early June 1989, and another survey is planned for August. The results of these surveys are presented in Chapter 4.

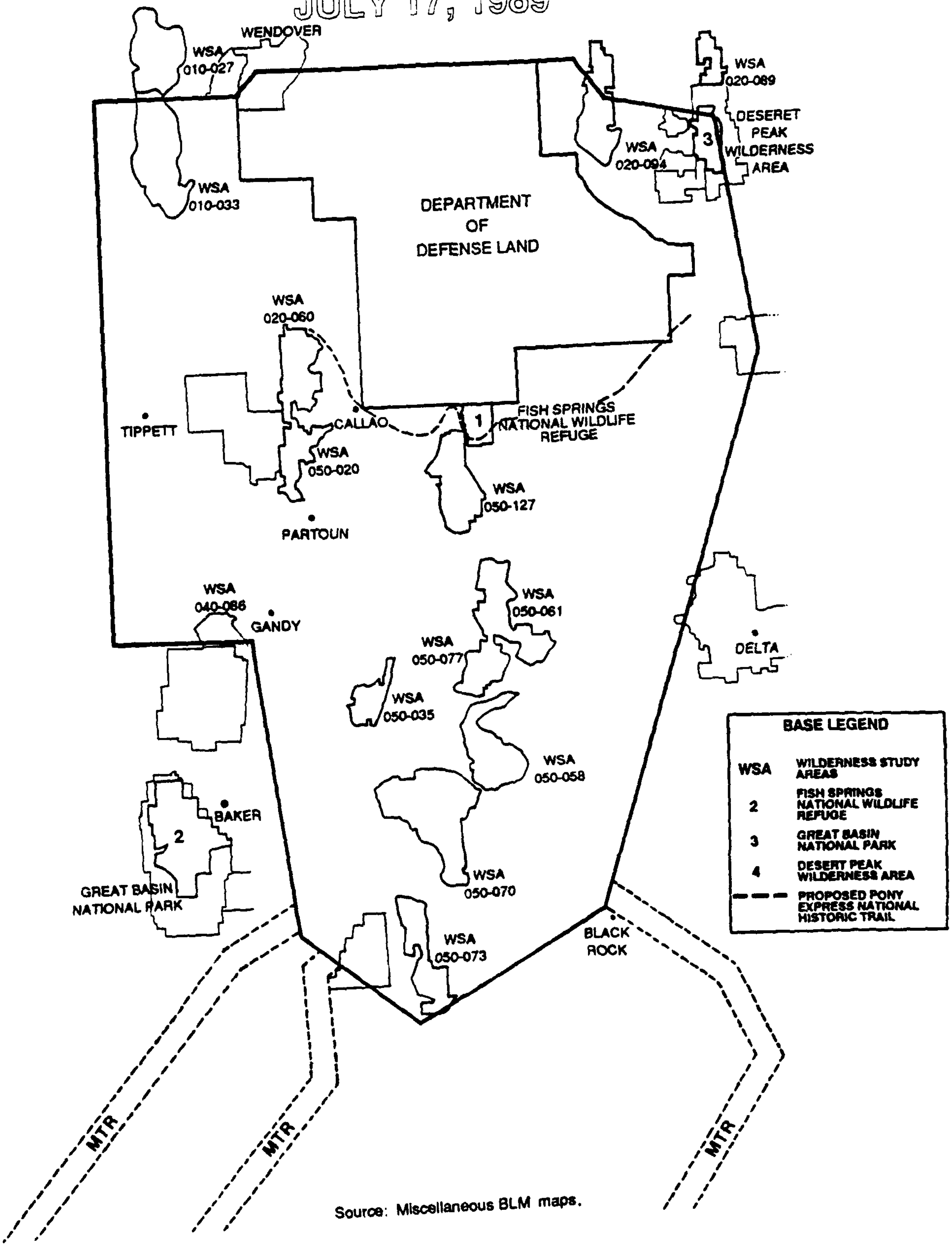
3.4 UNIQUE FEDERAL LANDS

3.4.1 DEFINITION OF RESOURCE, ISSUES, AND CONCERNS

Federally protected lands in the affected region include Wilderness Study Areas (WSAs), Fish Springs National Wildlife Refuge, Great Basin National Park, Deseret Peak Wilderness Area, and the proposed Pony Express National Historic Trail (Figure 3.4-1). These lands, established by various acts of Congress, are maintained in their natural condition for both the enjoyment of people and for conservation. The ECTC program has the potential to impact upon the lands which the Bureau of Land Management (BLM) has the task of managing and protecting for the purposes for which they were originally established.

3.4.2 WILDERNESS STUDY AREAS

Several WSAs exist in the vicinity of the proposed ECTC program (Figure 3.4-1). Table 3.4-1 lists the names and numbers of those WSAs potentially affected by ECTC operations. The Federal Land Policy and Management Act (FLPMA) of 1976 required the Secretary of the Interior to inventory public lands and to identify areas that have wilderness characteristics. Those areas having wilderness characteristics are referred to as Wilderness Study Areas. By October 21, 1991, the Secretary must report to the President on the suitability or nonsuitability of each WSA for inclusion in the National Wilderness Preservation System. The President will then report his recommendations to Congress by October 21, 1993. Until Congress acts on the President's recommendations, the Secretary (through the BLM) is required to manage WSAs so as not to impair their suitability for preservation as wilderness.



Source: Miscellaneous BLM maps.

Figure 3.4-1. Unique Federal lands in the program area.

Table 3.4-1

Wilderness Study Areas (WSAs) potentially affected by ECTC activities.

Name	Number
Cedar Mountains WSA	020-094
Deep Creek Mountains WSA	050-020 020-060
Fish Springs WSA	050-127
Swasey Mountain WSA	050-061
Howell Peak WSA	050-077
Conger Mountain WSA	050-035
Notch Pea.. WSA	050-078
King Top WSA	050-070

The BLM has implemented guidelines for the interim management of WSAs until Congress acts on the President's recommendations (BLM, 1987c). In all likelihood, Congress will not make its final decisions until the late 1990s. It is therefore expected that for the next 10 years WSAs will be managed as if they were formal wilderness areas. With few exceptions, such as valid mining claims and leases, ground-disturbing activities are not allowed in WSAs if these activities could permanently threaten wilderness characteristics.

When the BLM established WSAs in Utah in 1980, they acknowledged that low-flying military jets operate in west-central Utah (BLM, 1980). The BLM concluded, however, that these flights are "infrequent and of short duration" and, therefore, do not significantly affect the solitude of the WSAs (BLM, 1980).

In 1986 the BLM issued its Draft Environmental Impact Statement (EIS) on Utah's Statewide Wilderness Program (BLM, 1986). In this document the BLM proposed that the acreage of several WSAs bordering Tule, Snake, and Whirlwind valleys be reduced because outstanding opportunities for solitude are not available. The BLM cited a variety of factors that, collectively, impair solitude in portions of these WSAs. These factors include a lack of topographic and vegetative screening on slopes leading to adjoining valleys, traffic on nearby roads and occasional offsite intrusions from low-flying military aircraft. Regarding military overflights, the BLM (1986) concluded that military aircraft "...occasionally fly directly over [the WSAs], and these overflights can be a source of annoyance to visitors seeking solitude. Most of these overflights are usually not directly over [WSAs] and are subsonic in this area. Military flights are occasional offsite intrusions (sight and sound) that detract from, but generally do not eliminate, the overall opportunities for solitude."

3.4.3 GREAT BASIN NATIONAL PARK

In 1986 Congress established Great Basin National Park in east-central Nevada (Public Law 99-565; see Figure 3.4-1). The park is administered by the National Park Service and includes what was known previously as Lehman Caves National Monument.

The purpose of Great Basin National Park is "to preserve for the benefit and inspiration of the people a representative segment of the Great Basin of the Western United States possessing outstanding resources and significant geological and scenic values" [Sec. 2(a) of Public Law 99-565]. In establishing Great Basin National Park, the Congress mandated that the Secretary of the Interior protect, manage, and administer the park for public use and enjoyment and to perpetuate the park's natural qualities for future generations.

Low-flying military flights occasionally pass over Great Basin National Park. These flights are generally along an established east-to-west military training route that passes directly over the Park. Aircraft are allowed to fly along this route at altitudes ranging from the surface to 1,500 ft above the ground.

3.4.4 FISH SPRINGS NATIONAL WILDLIFE REFUGE

Fish Springs National Wildlife Refuge was established by Congress in 1959, and enlarged in 1961 (Public Land Orders 1942 and 2563; see Figure 3.4-1). The refuge is managed by the U.S. Fish and Wildlife Service and serves as a waterfowl resting and nesting area in the Pacific Flyway (see discussion in Section 3.3.4.1). The purpose of the refuge is "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Treaty Act, 16 USC & 715-715r, as amended).

Low-flying military flights occasionally pass over Fish Springs National Wildlife Refuge. These flights are within the restricted airspace associated with the UTTR where pilots are, with some exceptions, allowed to fly as low as 100 feet above ground level (AGL). Air Force Flight Test Center (AFFTC) regulation 55-18 recommends, however, that pilots should fly a minimum of 2,000 ft AGL when passing over Fish Springs National Wildlife Refuge because of potential bird-strike hazards. Discussions with personnel at Fish Springs indicate that jets currently fly over the marsh at altitudes of a few hundred feet AGL. The frequency of the overflights varies widely, but during major exercises, which occur several times a year, as many as several dozen jets per day may fly over the marsh at low altitude.

3.4.5 DESERET PEAK WILDERNESS AREA

Congress established Deseret Peak Wilderness Area with passage of Utah Wilderness Act in 1984 (Figure 3.4-1). The wilderness area lies within the UTTR and is administered by the U.S. Forest Service according to principles established in the Wilderness Act of 1964 (Public Law 88-577). Like all other wilderness areas, Deseret Peak Wilderness is an area where "the earth and its community of life are untrammeled by man ...retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions" [Sec. 2(c) of the Wilderness Act].

3.4.6 OTHER SITES

A proposal by the Department of the Interior recommends that a part of the Pony Express Trail through Utah be included in the National Historic Trails System (National Park Service, 1987; see Figure 3.4-1). If approved by Congress, the trail would become a National Historic Trail. The National Park Service would manage the trail along those segments that lie on Federal land.

3.5 CULTURAL RESOURCES: ARCHAEOLOGICAL AND NATIVE AMERICAN

3.5.1 DEFINITION OF RESOURCE, ISSUES, AND CONCERNS

Cultural resources that could be affected by construction and operation of the ECTC include prehistoric-archaeological, historic, architectural, and American Indian resources.

Prehistoric-archaeological resources are defined as physical remnants of human activity that predate the advent of written records in a particular culture and geographic region. They include archaeological sites, structures, artifacts, and other evidence of prehistoric human behavior.

Historic resources consist of physical properties or locations postdating the advent of written records in a particular culture and geographic region. They include archaeological sites, structures, artifacts, documents, and other evidence of human behavior. Historic resources also include locations associated with events that have made a significant contribution to history, or that are associated with the lives of historically significant persons.

Architectural resources include prehistoric or historic structures, buildings, and other objects related to past human use.

American Indian resources may be prehistoric sites and artifacts, historic areas of occupation and events, historic and contemporary sacred areas, materials used to produce implements and sacred objects, hunting and gathering areas, and other botanical, biological, and geological resources of importance to contemporary American Indian groups.

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Section 106 of the National Historic Preservation Act (NHPA) of 1966 directed Federal agencies to take into account the effects of their proposed activities on any district, site, building, structure, or object that is included in or is eligible for the National Register of Historic Places (i.e., an actual or potential historic property). The NHPA established the Advisory Council on Historic Preservation (ACHP) and authorized the ACHP to draft rules and guidelines for accomplishing the goal of Section 106 review under the NHPA. Other regulatory requirements designed to protect cultural resources on lands administered by Federal agencies or that are potentially threatened by proposed Federal undertakings include the Archaeological Resources Protection Act of 1979, the American Antiquities Act of 1906, Executive order 11593, and the Criteria for Comprehensive State-Wide Historic Surveys and Plans. Airforce Regulation 126-7, entitled Historic Preservation, establishes requirements to survey Air Force lands for archaeological resources, ensure preservation of the resources discovered, and publicize general historic and archaeological preservation awareness to all assigned personnel.

The American Indian Religious Freedom Act (AIRFA) of 1978 stated that it is the policy of the United States to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise their traditional religions. The ACHP issued draft guidelines in 1985 that incorporated the requirements associated with AIRFA under Section 106 of the NHPA. The ACHP recommended that traditional cultural and religious values of American Indian people be included under Section 106 of the NHPA because religion is not segregated from other aspects of American Indian society and because places of worship and veneration are cultural landscapes, mountains, lakes, rocks, trees, plants, animals, running water, and other natural features endowed with protective power in Native American religious belief.

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3.5.2 OVERVIEW OF CULTURAL HISTORY WITHIN THE UTTR

The area encompassed by the UTTR and the proposed ECTC has been occupied and used over the past 12,000 years. The prehistory consists of six periods of aboriginal occupation, and the historic period begins with the Escalante expedition of 1776. The cultural history is described in more detail in Batterman and Smith (1989) and Stoffle et al. (1989), and in the references cited in these reports.

3.5.2.1 Prehistoric periods

The Paleoindian period in the eastern region of the Great Basin spanned from about 12,000 to 9,000 years ago. Artifacts from this period consist mostly of Clovis, Folsom, and Lake Mojave projectile points. Many of the sites are associated with Pleistocene or early Holocene beaches and suggest that the people subsisted on resources in and around lakes and marshes.

The Early Archaic period dates from about 9,000 to 5,500 years ago. Cave sites, basketry, flat milling stones, and Elko, Pinto, and Humboldt-series projectile points have been found in caves associated with early Holocene levels of the Great Salt Lake. This settlement pattern suggests a sedentary or semi-sedentary subsistence based on a marsh and saltflat ecosystem that surrounded the Great Salt Lake at that time.

The Middle Archaic period, between 5,500 and 3,500 years ago, marks a shift in subsistence patterns to a form that consisted of movements from site to site to exploit several ecozones. In addition to lakeshore environments, upland areas, including the fault-block mountains south of the lake, were occupied during this period. A diversity of resources were exploited, including Indian ricegrass, rabbit, deer, bison, and mountain sheep. Among the

projectile points of this period are Elko, Gypsum, and Mckean styles of points.

The Late Archaic period dates from 3,500 to 1,600 years ago and is characterized by increased use of upland areas and a marked reduction in lakeshore habitation. This change coincides with a period of increased moisture that resulted in rising lake levels and flooding of most marsh areas and peripheral freshwater springs. The limited information on subsistence during this period suggests that pinyon nuts were used for the first time as food. Projectile points of the Late Archaic period included Elko and Gypsum series, as well as Rose Spring corner-notched arrow points.

The Sevier/Fremont period dates from 1,600 to 650 years ago and marks the formative stage in the eastern portion of the Great Basin. While much debate surrounds origin and classification of the Sevier/Fremont people, subsistence appears to have been based primarily on collecting wild plants and animals from marsh environments, supplemented by production of corn. Some villages were located on alluvial fans adjacent to marsh or riverine ecosystems, while temporary encampments were spread throughout other environmental zones. In other areas such as adjacent to Fish Springs and Deep Creek Mountains, the Sevier/Fremont people were nomadic collectors and harvesters, similar to people in preceding Archaic periods. This period is characterized by small corner-notched and side-notched projectile points, grayware pottery, engraved pebbles, and grinding stones.

The period known as Paiute/Shoshone dates from approximately 700 to 500 years ago with the appearance of the predecessors of the Indian people of the historic period. Historic period Indian people are discussed in the following section.

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3.5.2.2 Historic period

American Indian groups with historic ties to the UTTR area are the Goshutes, Pahvants, and Utes. Goshutes have direct ties with the northern portion of the UTTR, Pahvants with the southern portion. Utes are tied to the area through extensive intermarriage with the Goshute and Pahvant people.

Goshute, Pahvant, Ute, Paiute, and Shoshone peoples spoke mutually intelligible Numic languages, shared many cultural characteristics, traded, and occasionally intermarried prior to Euroamerican contact. High rates of intermarriage led to considerable disagreement among Euroamericans about the ethnic identity of the Goshutes and Pahvants. The Goshutes were alternately described as Western Shoshone, as Ute, and as a distinct Goshute tribe or nation, while Pahvants were described as Ute, as Southern Paiute, and as Pahvant.

The earliest record of Euroamerican contact with Pahvant, Goshute, or Ute people is that of Father Escalante and his party, who spent several days in 1776 traveling through Pahvant territory in search of a trade route between Santa Fe and the Pacific Coast. The Spaniards camped on the banks of the Sevier River and encountered Pahvant people whom they found to be amiable and gentle. Euroamericans did not enter the eastern portion of the Great Basin again until the 1820s, when traders, trappers, and explorers started to cross the area. By the 1830s, the Old Spanish Trail, located within 40 miles of Goshute territory, was a major trade route. American Indian slaves were transported along this route, and the horseless Goshute and Pahvant people were among the groups that experienced heavy losses to mounted American Indian and Euroamerican slave raiders. In response, the Goshute adopted a strategy of avoidance and flight, retreating into more remote and more arid parts of their territory.

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Mormon settlement in central Utah began in 1847. Colonization of the region led to hostilities between the Mormons and the Utes in the Utah Valley and in other Valleys near the Wasatch Mountains. As Utes were progressively defeated and displaced from central Utah, some of them relocated into Goshute territory, where they intermarried with Goshute people. In about 1850, small numbers of Euroamericans, most of them Mormons, began settling in Tooele Valley. Soon after, Mormon settlers spread west into Skull Valley. These settlements were not the highly organized Mormon colonies that were established in many parts of Utah, but followed a single-family farm pattern of development because of limited water. Organized settlement in the western portion of Tooele County did not occur until 1860, when the community of Ibapah, also known as Deep Creek, was founded. The early Mormon settlers met considerable resistance from the Goshutes, in the form of raids on livestock. The settlers formed a military company and carried out numerous counter-raids on Goshute camps from 1849 through 1851.

Beginning in 1849, U.S. government survey parties explored western Utah in search of suitable routes for east-west wagon roads and for the Pacific Railroad. By the late 1850s, a corridor had been established across Goshute territory for systematic Euroamerican transportation and communication. In 1858 and 1859, J. H. Simpson pioneered a new wagon route across the desert; the route passed along Fish Springs and through Snake Valley. In 1860, the Overland Stage and Pony Express maintained 22 stations along a route that essentially followed the route developed earlier by Simpson. Stations were located at Simpson Springs, Fish Springs, Boyd Springs, and Willow Springs. Financial problems and completion of the telegraph brought an end to the Pony Express in 1861.

The existence of this transportation corridor through Goshute territory led to the loss of access to many important resources on which the Goshutes depended. On October 12, 1863, U.S.

Commissioners concluded a treaty with Goshute representatives from the Skull Valley/Tooele Valley area but not from Deep Creek and other parts of Goshute territory. The treaty committed the Goshutes to acceptance of Euroamerican travel, settlement, development, mining, and military posts throughout the region. After 1863, population centers for Goshute people were in the area of Deep Creek, Tooele Valley and Skull Valley, although Goshute people continued to live throughout the region.

Mining activity for lead, silver, and gold began in the eastern portion of the Great Basin in the 1850s. The distance of mines from railroad connections prevented extensive mining operations throughout the region. The Utah and Golena Mines at Fish Springs transported ore using established wagon freight operations. Camps associated with mining were located at Granite, Fish Springs, and Joy.

The town of Deseret was founded by Mormon settlers in 1859 in the wetland region along the lower Sevier River. This area was used by many Pahvant people, who lived in the vicinity of Corn Creek, Kanosh, Sevier Lake, and Sevier River. In 1865, the Treaty of Spanish Fork ceded all of the Pahvants' territory, except the Corn Creek reserve, and opened it for Euroamerican settlement.

Other important historic events in the study area include the Lincoln Highway, which was the first transcontinental automobile road completed through Tooele County in 1918. The Lincoln Highway was abandoned in 1920 and was replaced by the Wendover Route, which heads directly west out of Salt Lake City. Several water storage and flood control projects were completed in the western deserts of Utah after the establishment of the Civilian Conservation Corps (CCC) in 1933. The CCC constructed reservoirs, developed springs, and placed water troughs throughout the area, which provided a boost to the livestock industry. Remains of CCC camps include the

Antelope Springs camp near Swasey Peak and the Callao camp south of Callao on Tom's Creek.

3.5.3 PROPERTIES ON THE NATIONAL REGISTER OF HISTORIC PLACES

Four properties within or near the UTTR are listed in the National Register: Wendover Airfield, Danger Cave, Lincoln Highway Bridge, and Fish Springs Caves Archaeological District.

Wendover Airfield is significant as a result of its role in the atomic age. The base served as the training site for the 509th Group under the command of Colonel P.W. Tibbets, who flew the Enola Gay and dropped atomic bombs on Hiroshima an Nagasaki in August 1945. Danger Cave, located near Wendover, Utah, was the site of major archaeological excavations in the early 1950s. These excavations revealed a record of cultural remains spanning the past 10,000 years; it provided the first description of the lengthy prehistoric habitation of the eastern Great Basin. The Lincoln Highway Bridge is located on Dugway Proving Ground (DPG) and was constructed around 1900 from hewn logs and log supports. The bridge is the only significant structure remaining in this area from the original transcontinental Lincoln Highway. Fish Springs Caves Archaeological District consists of four caves at the north end of Fish Springs Range, near Fish Springs National Wildlife Refuge. These caves contain intact deposits of cultural remains dating from 4,000 years ago. The caves at Fish Springs are the only National Register site in the South Range of the UTTR.

In addition to the sites listed on the National Register, other historic sites occur throughout the area. Among these are stations associated with the Pony Express Trail, including Boyd Station, which still contains standing walls. The Antelope Springs and Callao CCC camps are important sites that contain concrete building foundations in various stages of decay. Other historic sites

include Marjum Pass Cabin at Marjum Pass, Robbers Roost in the Swasey Mountains, and the Swasey Mountain sawmill. Sites of significance to American Indian people and important prehistoric sites occur throughout the area.

3.5.4 AREAS OF LIKELY CULTURAL RESOURCE SENSITIVITY

This section summarizes the literature reviews, archaeological inventories, field surveys, and indepth, on-site discussions with Goshute, Southern Paiute, Pahvant, and Ute representatives that were conducted for this EIS and that are described in detail in Batterman and Smith (1989) and Stoffle et al. (1989). Areas of likely cultural resource sensituity within the ECTC program area are also described in this section. Archaeological inventories at each initial operating capability (IOC) site and associated access road in each valley were conducted by professional archaeologists using pedestrian survey methods (Batterman and Smith, 1989). In-depth interviews with American Indian representatives were conducted at many of the IOC sites and throughout the valleys by cultural anthropologists (Stoffle et al., 1989). The results of these inventories and interviews are also described in this section.

3.5.4.1 Archaeological literature review

A Class I file search was conducted from February 27 to March 2, 1989, at the Antiquities Section, Utah State Historical Society, Salt Lake City, Utah. A records search of previous cultural resource inventories within Tule, Snake, and Whirlwind valleys indicated that no investigations have been conducted in any land sections containing IOC sites, nor had any archaeological site been recorded in these sections. A total of 158 sites have been recorded in other areas of the valleys including 88 in Tule Valley,

9 in Snake Valley, and 43 in Whirlwind Valley. Of these sites, 153 are prehistoric, 1 is historic, and 4 are of unknown age. Most of these sites are located along extinct lake shorelines, within dunal areas, or in the vicinity of springs and marshes; 96 (61 percent) are associated with water sources or sand dunes. These sites mostly consist of flaked stone artifact and ceramic scatters, with quarry sites and open campsites occurring less frequently.

One of the largest archaeological investigations in the area was conducted by Berge (1964) in Tule Valley. During his nonsystematic inventory of the sand dunes and spring areas in the valley, he recorded 72 prehistoric sites. Most of the known archaeological sites in the valley were recorded by Berge. As part of cultural resource studies for the M-X project (University of Utah, 1980), 80-acre sample units were examined in Tule and Whirlwind valleys. Sample unit also were placed in Snake Valley, but south of U.S. Highway 50 and outside of the ECTC program area. Within these sample units, 39 sites were recorded in Tule and Whirlwind valleys. Most of the remaining archaeological investigations were conducted as a result of geotechnical tests, geothermal investigations, and aquifer studies. These archaeological studies generally focused on scattered small parcels of land.

3.5.4.2 Overview of sensitive cultural resource areas

Using information gathered through review of archaeological files (Batterman and Smith, 1989) and ethnographic literature (Stoffle et al., 1989), and discussion with American Indian representatives (Stoffle et al., 1989), sensitive cultural resource areas in the South Range of the UTTR were identified. Areas of high sensitivity, where cultural resources are likely to be located, are indicated in Figure 3.5-1.

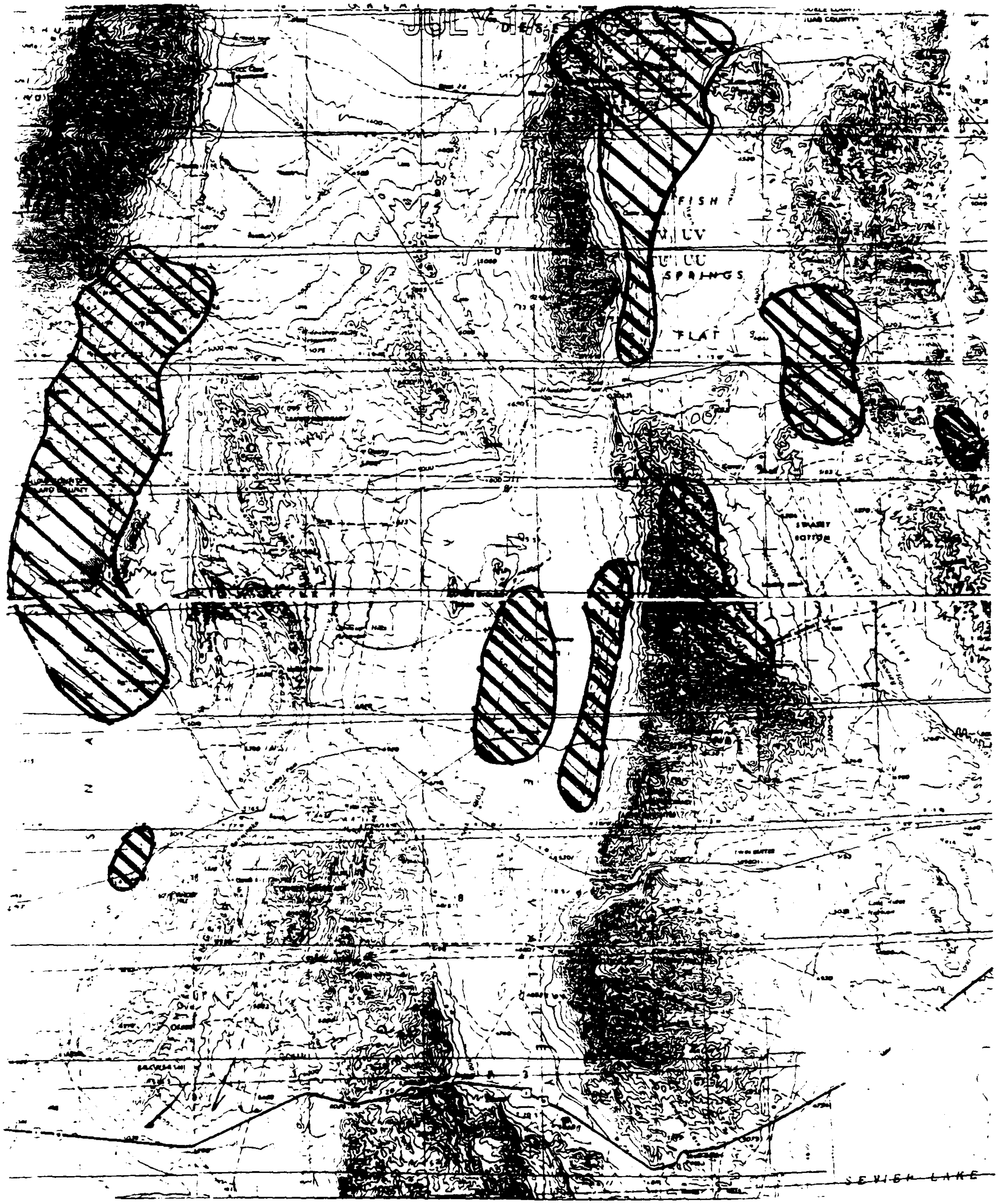

Figure 3.5-1 Potentially high sensitive areas for cultural resources.

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Topographic features associated with areas of high, medium, and low sensitivity are as follows:

Areas of High Sensitivity:	Sand dunes Water sources (springs, lakes, marshes, playas) Cave and rock shelters Shorelines of former Lake Bonneville High mountain peaks
Areas of Medium Sensitivity:	Vegetated flats Foothills
Areas of Low Sensitivity:	Salt flats Steep slopes (except rock outcrops that could contain rockshelters, rock art, or burials)

3.5.5 LOCATIONS OF PROPOSED ACTION

3.5.5.1 Tule Valley

Overview

Archaeology

Several areas in Tule Valley are considered highly sensitive to cultural resource concerns. A high density of prehistoric campsites are located in sand dunes associated with springs and old beach lines (Berge, 1964). A large sand dune complex occurs in the north-central portion of the valley. Tule Springs and Coyote Springs, which are the major water sources for the valley, are centrally located near this dune field. Another series of sand dunes exists along an old beach line in the east-central area of

the valley. Other areas in Tule Valley, especially north of Coyote Knolls, have topographic features that suggest low-to-medium cultural resources sensitivity because they contain little water and few sand dunes.

American Indian

American Indian Goshute representatives recalled the Indian names for Coyote Knolls and Coyote Springs, and suggested that the area from Coyote Knolls to Chalk Knolls would have been important for hunting, fishing and plant gathering. This area includes the major springs in the valley. Goshute representatives also noted a possible trail through the Sand Pass area and they recalled a trail north of Sand Pass that Goshute people living near present-day Dugway used on their way to Skull Valley. Eagles and antelope were observed in the valley. Eagles are extremely significant to the religious beliefs of the Southern Paiute and Pahvant people.

Inital operating capability sites

Archaeological

Intensive archaeological inventories were conducted at each of the 13 IOC tactical threat area (TTA) sites and along access roads to these sites in Tule Valley. No archaeological sites or significant remains were encountered at any of the sites.

American Indian

American Indian representatives evaluated the sensitivity of each site in terms of nearness to springs, artifacts and burials, plants, animals, minerals, and aesthetics. American Indian representatives interpreted seven sites as having low cultural-resource sensitivity, five with medium levels of sensitivity

because of aesthetics and plants, and one site with high sensitivity because of aesthetics.

3.5.5.2 RMF, ITA, STA, gapfiller radar, and fiber-optics line

The proposed site of the Tule Valley range maintenance facility (RMF) is at Sand Pass. Because of the presence of sand dunes in the vicinity of the RMF site, American Indian representatives expressed low-to-medium levels of concern for potential cultural resources in the area. When American Indian representatives visited the area near, but not on, the site, they located obsidian lithic scatter and some worked flakes. No archaeological resources were found during the archaeological inventory conducted within the RMF site boundaries.

The intermediate threat area (ITA) sites are located in the Great Salt Lake Desert west of DPG. The sites were not visited by the archaeologists or the American Indian representatives. Because of their topographic setting, these sites are likely to have low levels of cultural resource sensitivity.

The strategic threat area (STA) sites are grouped into two arrays. One array is in the Great Salt Lake Desert west of Wildcat Mountain. This array was not visited by archaeologists or American Indian representatives. Their topographic setting indicates they are likely to have low levels of cultural resource sensitivity. Ethnographic evidence, however, indicates that major Goshute villages existed within easy walking distance of this STA array and the second STA array.

The second STA array lies a short distance west of the Cedar Mountains. The area was not visited by archaeologists: Goshute representatives visited the area around the sites, but did not

is in an area of medium-to-high cultural resource sensitivity. It is located at the edge of the Great Salt Lake Desert, near an ancient shoreline of Lake Bonneville. Several archaeological sites have been recorded in the vicinity of this STA array. Goshute representatives expressed high levels of concern for the location of this STA array because of the existence of historic Goshute villages located within walking distance from this array.

The site for the gapfiller radar is Frisco Peak in the San Francisco Mountains. The site was selected because it is the highest peak in the range. Neither archaeologists nor American Indian representatives visited this site. It is in an area of low-to-medium sensitivity for archaeological resources. However, an American Indian representative (Paiute) recalled that there were abundant pinenuts on Frisco Peak, as well as an abundance of herbs on the mountain and in the flats around it. Wah Wah Valley and its springs to the west of Frisco Peak were important areas of American Indian habitation and use. Because of the frequency with which Paiute and Pahvant people from Kanoch and Indian Peak used the San Francisco Mountain area, the representative stated there was a good possibility that a burial area may be located on the mountain and, therefore, judged the mountain to be highly sensitive for American Indian values.

The fiber-optics line under the proposed action will follow an existing railroad bed or will be placed in existing conduit. The locations were not addressed specifically because these alternative areas are already disturbed.

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3.5.6 LOCATIONS OF SNAKE VALLEY ALTERNATIVE

3.5.6.1 Snake Valley

Overview

Archaeological

Snake Valley is likely to be more sensitive to cultural resource concerns than Tule Valley and about as sensitive as Whirlwind Valley. Several streams, such as Trout Creek, flow east from the Deep Creek Range into the central and northern areas of the valley. The central valley contains abundant springs and marshes that make Snake Valley the most watered of the three valleys. Sand dunes are associated with many of the marsh and spring areas. Except near springs, the area south of the salt marshes in the valley is poorly drained; vegetation consists mostly of greasewood and shadscale, suggesting low-to-medium cultural resource sensitivity.

American Indian

Snake Valley is an important area to Goshute people and may have comprised part of their core traditional territory. According to Native American representatives, the valley was an area of much travel, social activity, intergroup gatherings, and habitations. Representatives recalled, and ethnohistorical literature documents, that large concentrations of Goshute people lived in the area around the present-day towns of Gandy, Baker and Garrison. Several springs in the Bishop Springs area were known as important sites for camping, social gathering, and perhaps semi-permanent residences. Snake Valley was interpreted as a historically and currently important area to Indian people, particularly to Goshute people.

Initial operating capability sites

Archaeological

Intensive archaeological inventories were conducted by professional archaeologists at each of the 13 IOC TTA sites and associated access roads in Snake Valley. One archaeological site was discovered consisting of a discrete scatter of Sevier/Fremont pottery sherds from a single, prehistoric vessel; a single obsidian flake, and three pieces of a grinding stone. The site is similar to numerous other sites in western Utah and is unlikely to provide any additional information important in prehistory or history, and was recommended as not eligible for the National Register.

American Indian

American Indian representatives evaluated the Snake Valley TTA sites according to the same criteria as sites in Tule Valley. They judged nine sites to have low levels of cultural resource sensitivity. Two sites were judged to have medium levels of sensitivity because one site was near Knoll Spring and the other had culturally valued plants. The two remaining sites were not visited by the representatives.

3.5.6.2 RMF, ITA, STA, gapfiller radar, and fiber-optics line

The locations of ITA, STA, gapfiller radar, and fiber-optics line are the same as the proposed action. The RMF location is located in an area of low-to-medium sensitivity. Archaeological inventory of the site itself located no surface archaeological resources. American Indian representatives noted that the alkali mud flats would not have been conducive to camping; nevertheless, many lowland areas such as this site were used for animal drives,

agriculture, and the collection of medicinal plants. The representatives judged the area to have a low level of sensitivity.

3.5.7 LOCATIONS OF WHIRLWIND VALLEY ALTERNATIVE

3.5.7.1 Whirlwind Valley

Overview

Archaeological

Various areas in Whirlwind Valley are highly sensitive to cultural resource concerns. Fish Springs Flat is located in the northern portion of the valley and contains the marshes of Fish Springs National Wildlife Refuge. Several archaeological sites have been recorded in this area. At the north end of the Fish Springs Range, immediately west of the springs, many large caves and rockshelters exist. Small sand dunes extend the length of the west side of Fish Springs Flat. Archaeological sites are know to occur in the eastern portion of the flat and may be associated with obsidian quarries on the southern end of the Thomas Range. Areas south of Fish Springs Flat may be of low-to-medium sensitivity since the area consists of valley flats lacking water sources.

American Indian

American Indian representatives interpreted the valley as significant to Indian people. Goshute representatives recalled that the valley was frequently used as a travel route; one elder remembered that his father traveled on horseback through the valley on his way to Indian Peak. A Goshute elder remembered that his father told him about all the springs in the area and their Indian names. Additionally, his father had told him about all the burial grounds in the springs area. Petroglyphs in the valley were

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recalled and were interpreted as maps or resource guides to portions of the valley. Abundant plant and animal life around the Shoenburger-Larid Springs complex indicated ideal stopping or habitation areas for Indian people. A Goshute elder mentioned that his father had told him there was a burial place near Shoenburger Spring, and a Paiute elder interpreted the spring complex as a spiritually powerful place. Many plants historically and currently used by Indian people were identified in areas surrounding springs.

The gapfiller radar site for the Whirlwind alternative is the same as for the proposed action. Neither archaeologists nor American Indian representatives visited the Frisco Peak site. Nevertheless, Indian representatives expressed concern for the site because high elevation sites (e.g., peaks) were places where Indian people harvested pinenuts and held social and ceremonial activities. Peaks may have been the loci of spiritual power and religions significance.

Initial operating capability sites

Archaeological

Intensive archaeological inventories were conducted at each of the 13 IOC TTA sites and associated access roads in Whirlwind Valley. An isolated, large tertiary flake of dendritic chert with utilization scars on one edge was found on one access road survey. The flake is located in a low dunal area that appears to be on the shores of a former lake. No other archaeological resources were evident in association with the isolated flake.

American Indian

American Indian representatives judged eight sites as having low levels of cultural resource sensitivity. Four sites were

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interpreted as in an area having the potential for historic Indian occupation, important plants, and cultural remains, and were judged to have medium levels of sensitivity. One site was interpreted as being near a possible village or seed gathering area, and was judged to have a high level of sensitivity.

3.5.7.2 RMF, ITA, STA, gapfiller radar, and fiber-optics line

Locations of the ITA, STA, and fiber-optics lines are the same as the proposed action. the RMF site, as originally proposed was located on the flats at the northern entrance to the valley. During interviews at the original location, a Goshute representative discovered a projectile point belonging to the Paleoindian period, several obsidian flakes, and a biface tool. The area surrounding, but not on, the site contained a small rockshelter, numerous flakes, a quarry of source material, and a possible camping and food processing area. American Indian representatives considered the original RMF site as highly sensitive. The Air Force moved the Whirlwind RMF site two miles from the original site, to an area where no archaeological resources were identified.

3.6 AIRSPACE USE

3.6.1 DEFINITION OF RESOURCE, ISSUES, AND CONCERNS

Airspace use addresses how and where military and civil aircraft operate within the UTTR airspace. Issues related to ECTC airspace use focus on the effects of increased military traffic on civil access through the UTTR airspace and effects on airfields in the local area.

3.6.2 MILITARY USE

The UTTR encompasses 17,000 square miles of special use airspace within northwestern Utah and northeastern Nevada. The UTTR is made up of nine separate restricted areas and six military operations areas (MOAs) that are collectively divided into the North and South ranges. During fiscal year 1988, 17,487 sorties were conducted in the South Range (ECTC area of concern) for air combat tactics, bombing and gunnery training, and testing of both manned and unmanned aircraft. Approximately 65 percent of these operations were conducted by F-16's staged at Hill Air Force Base (AFB). The remainder were various fighter, bomber, and refueling aircraft from remote bases.

The UTTR is subdivided into high- and low-altitude working sectors to permit concurrent use of different portions of the range complex and to provide airspace for holding and transitioning between sectors. An integral part of the South Range is a supersonic operating area (SOA) where supersonic operations are authorized above 5,000 ft above ground level (AGL) (Figure 3.6-1). Approximately 600 supersonic operations are conducted monthly in this designated area. Refueling operations in support of UTTR activities are conducted along one of two aerial refueling routes within the UTTR.

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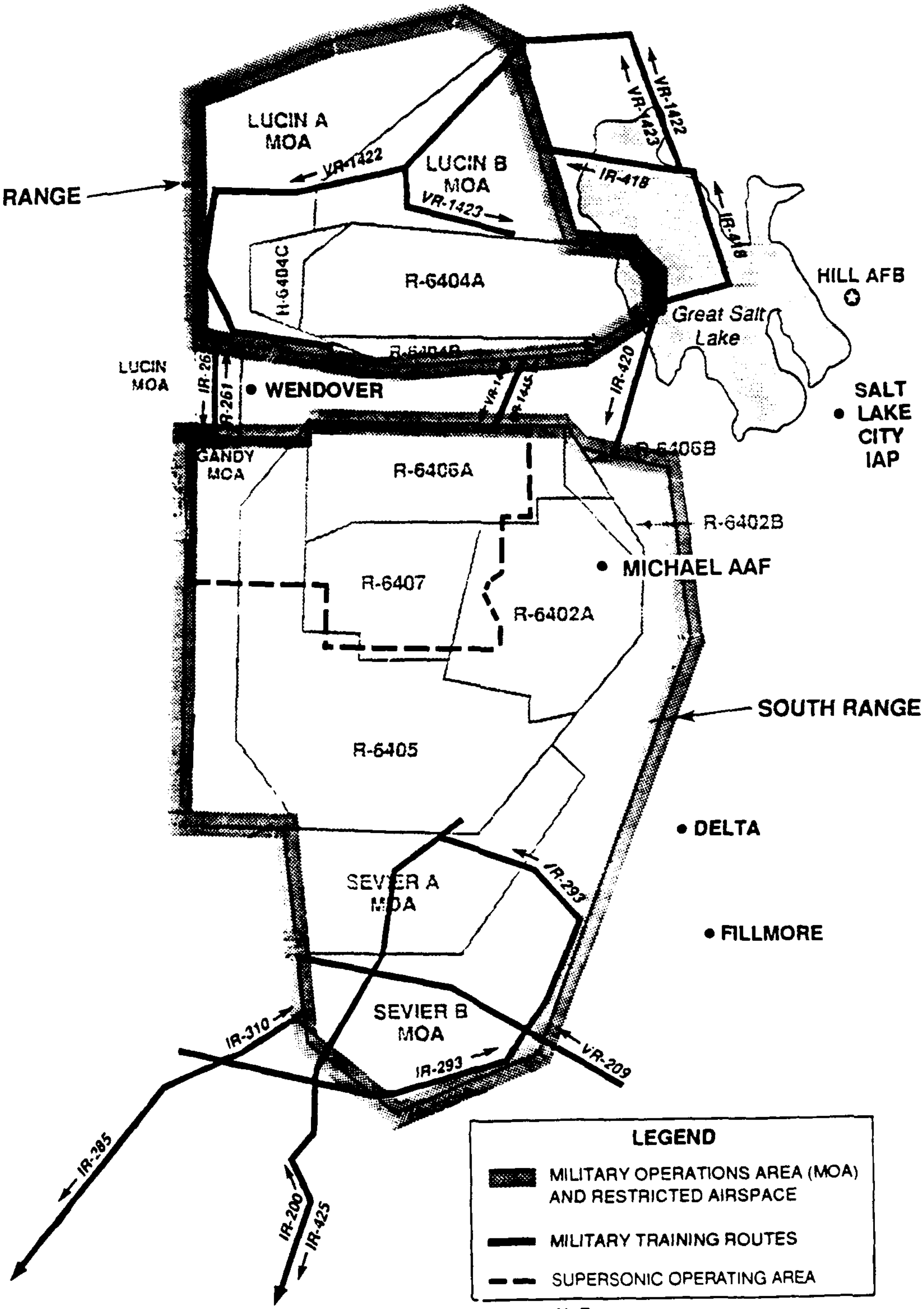

Source: Air Force.

Figure 3.6-1. Utah Test and Training Range (UTTR), South range and related airspace.

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Approximately 40 tanker missions per month are scheduled for UTTR refueling operations.

Military Training Routes (MTRs) associated with the UTTR consist of 11 instrument routes (IRs) and 6 visual routes (VRs) (Figure 3.6-2). Four of these MTRs are predominantly used by off-range aircraft when entering the UTTR from the south and southwest. Combined usage of these routes is approximately 60 flights per month. All training routes are normally flown within 500 ft of the surface or lowest altitude published for each route.

Future test and training programs on the UTTR (not including the ECTC) are expected to have an 11 percent increase in existing range operations by the year 2000. Night operations between 10:00 P.M. and 7:00 A.M. would increase from their present 10 percent of overall operations to approximately 23 percent (Welde, F., pers. comm., 1989). One factor contributing to this increase is the addition of a Low Altitude Navigation and Targeting Infrared for Night (LANTIRN) system designed for future use on F-16 C/D's at Hill AFB. This night-attack system enables air crews to fly under-the-weather using the same flying techniques and tactics that are currently used in daylight operations.

Low-altitude airspace use in the UTTR includes flight restrictions around towns, airfields, on-range military facilities, and Fish Spring National Wildlife Refuge. These flight-avoidance areas are defined and described in Air Force Flight Test Center (AFFTC) Regulation 55-18 and generally require aircraft and unmanned vehicles to stay at least 1,000 to 3,000 ft above the highest obstacle (Figure 3.6-2). Some restrictions prohibit overflights altogether.

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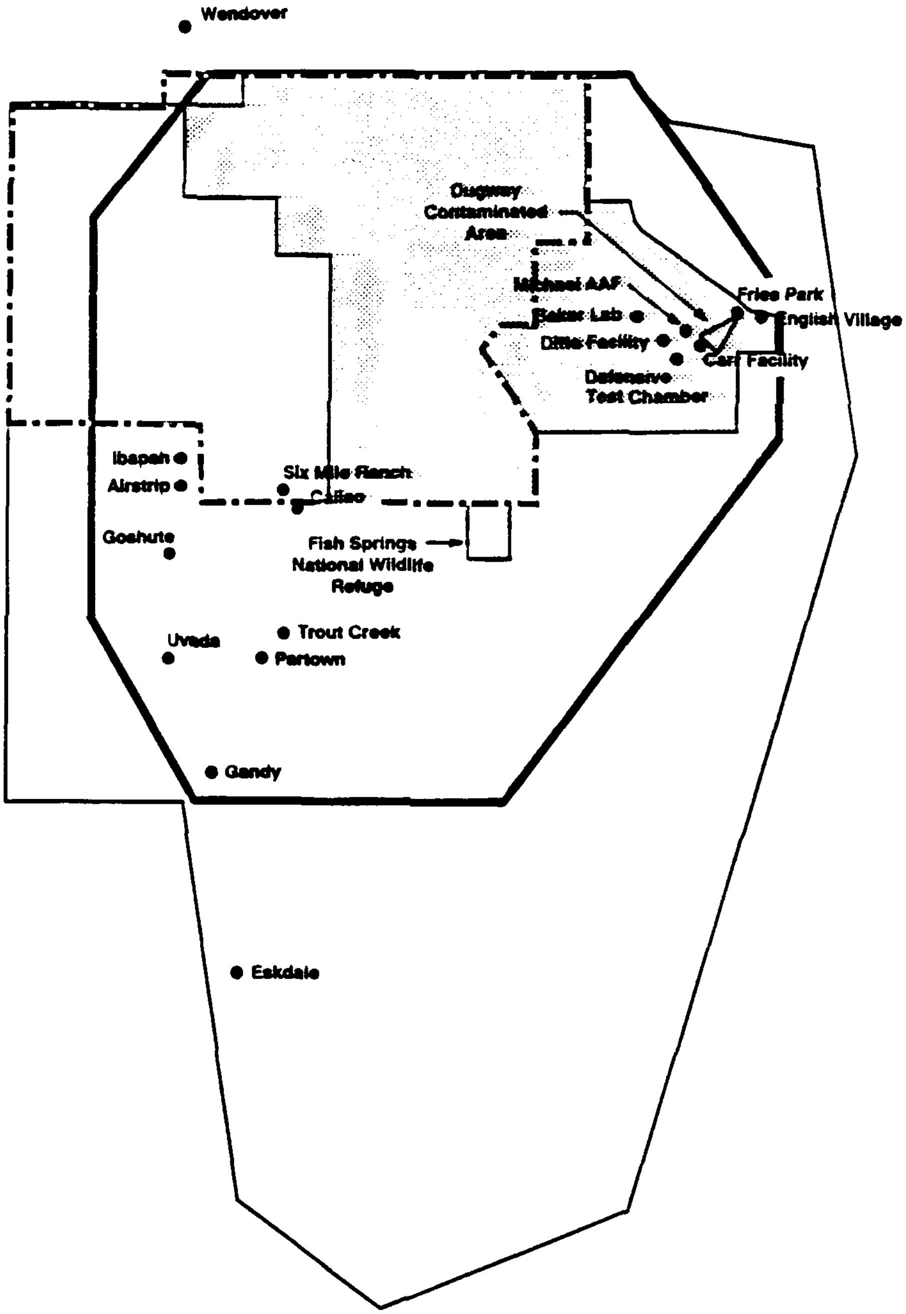

Figure 3.6-2. Aircraft Flight Avoidance Areas.

3.6.3 CIVILIAN USE

Commercial aircraft flights through the UTTR South Range are conducted either on a high altitude Jet Route, or other high routes as directed by air traffic control. The routes most commonly used by general aviation aircraft run along an east-west Federal Airway between the North and South ranges; north-south between Wendover and Callao; east-west between Callao and Delta; and east-west between Callao and Simpson Peak. Use of those route segments transiting through restricted airspace may be limited at times by scheduled military activities. Such access is dependent upon the extent of military use and the altitudes utilized. Civilian flight through the MOAs is not prohibited, and aircraft may transit these areas with or without air traffic control services, as the altitude dictates. Airspace management reports from Hill AFB indicate that 4,755 commercial and 2,757 general aviation aircraft are known to have transited various portions of the UTTR during fiscal year 1988. The number of additional civil aircraft transiting the MOAs without contacting an air traffic control agency cannot be determined.

There are three civilian airfields and one U.S. Army Airfield underneath or adjacent to the proposed ECTC air-use area. Michael Army Airfield (AAF) is located within Restricted Area 6402A to support activities at Dugway Proving Ground. Approximately 5,000 annual operations are conducted at this airfield by both military cargo helicopters, and light single- and twin-engine general aviation aircraft. F-16s frequently fly practice approaches to Michael AAF, as this airfield is an alternate emergency recovery base for the UTTR. Wendover is located west of Salt Lake City near the Utah-Nevada border; it is currently used as a municipal airport for single- and multi-engine aircraft, helicopters, military and business jets. Wendover is also an alternate emergency airfield for UTTR aircraft. Approximately 16,600 annual operations are

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conducted at Wendover. Delta is located about 100 miles south of Salt Lake City and 15 miles east of the Sevier B MOA boundary. This airfield averages 3,900 annual operations and is primarily used by single and multi-engine general aviation aircraft. Fillmore is located 30 miles to the south of Delta and 32 miles east of the Sevier B MOA. Light general aviation aircraft account for the majority of Fillmore's 2,000 annual operations. Low usage airstrips are also located at Callao, Ibapah, Trout Lake, and Gandy. Transit of aircraft from these airfields through portions of the UTTR would most commonly follow the routes described previously.

No specific information is available on projected increases in civilian flight activities; therefore, a Federal Aviation Agency (FAA) study was used to estimate future civil aviation (Aviation Forecasts, Fiscal Year 1987-1998). This study forecasts that growth in general aviation flying hours is expected to average a two percent increase per year for the next decade. Air carrier aircraft operations are forecast to increase at an annual rate of 2.4 percent through 1998. Based on these forecasts, general and commercial aviation would increase approximately 22 and 26 percent respectively by the year 2000. These increases will be assumed for civil air traffic increases in the UTTR area.

3.6.4 JOINT CIVIL-MILITARY AIRSPACE USE

The UTTR is normally scheduled for use from 6:00 A.M. to 6:00 P.M., Monday through Friday, and occasionally on weekends. The actual density of military operations during scheduled use will vary with the different training scenarios conducted. While civil aircraft may fly unrestricted through the MOAs, Range Control management indicates they will most generally transit below, above, or around the MOAs to remain clear of military aircraft, or request advisory service when going through the MOAs. Joint use of restricted

airspace is maximized to the extent possible through procedures contained in local Letters of Agreement and Memoranda of Understanding (MOU) between Hill AFB and other agencies, including the Salt Lake Air Route Traffic Control Center, the Dugway Proving Ground, and the State of Utah. The Letters Of Agreement outline coordination requirements for transferring control of airspace sectors, as available, to permit transit of non-participating aircraft. An MOU with the state outlines procedures by which state agencies and residents who own or lease land within the UTTR may transit restricted airspace. This MOU specifically describes how a pilot can contact Clover Control by telephone or radio and request clearance through restricted areas via defined routes. These procedures, along with the continued involvement of the Range Airspace Management Office at Hill AFB, serve to promote the compatible use of UTTR airspace by military and civilian aircraft.

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3.7 NOISE AND SONIC BOOM

3.7.1 DEFINITION OF RESOURCE, ISSUES, AND CONCERNS

Noise is defined for purposes of this analysis as unwanted sound heard by people or wildlife in proximity to activities undertaken during the construction, operations, and maintenance of the various components of the proposed ECTC program.

Noise may be intermittent or continuous, steady or impulsive; it may involve a broad range of sound sources and frequencies and be generally nondescript, or it may have a specific, readily identified sound. Human response to noise is extremely diverse and varies according to the type of noise source, the sensitivity and expectations of the receptor, the time of day, and the distance between the source and the receptor.

The decibel (dB) is the accepted standard unit for measuring the level of noise. It is generally adjusted to the A-scale (dBA) to correspond to the range of normal human hearing. In an outdoor environment, where sound levels are continuously changing, the energy-equivalent noise level (L_{eq}) is commonly used to average the level of sound from a variety of sources. The day-night noise level (L_{dn}) is an alternative common measure of noise level; it is computed equivalently to L_{eq} for a 24-hour period except that a 10 dB penalty is added to the measured noise levels occurring between 10:00 P.M. and 7:00 A.M. in recognition of increased sensitivity to noise during normal sleeping hours.

Aircraft noise is one of the most significant issues associated with the proposed action. Sub-issues related to noise are annoyance; safety due to surprise and startle effects as well as pressure waves; impacts on wildlife and domesticated animals; and adverse effects on the quality of life.

Federal regulations that govern the control and abatement of noise include the Operation Safety and Health Act of 1970, Noise Control Act of 1972, Quiet Communities Act of 1978, and Aviation and Noise Abatement Act of 1979.

3.7.2 BACKGROUND NOISE IN COMMUNITIES

Current noise levels in the ECTC region of influence are not generally known. General information applicable to the various noise environments is presented in the following paragraphs. Modeling has been conducted to determine future noise levels with and without the ECTC program. These results are presented in Section 4.7.

Residential communities in Utah that may be impacted by noise from proposed ECTC operations range from suburban areas around Salt Lake International Airport (SLC) to a few quiet, isolated towns and ranches.

In the suburban areas, background noise levels will be dominated by noise from nearby traffic or aircraft operations and will generally be in the range of 50 to 65 dB (averaged day/night level for a 24-hour period with a 10-dBA penalty during the noise sensitive areas from 10:00 P.M. to 7:00 A.M.) at positions well removed from airport boundaries (i.e., distances of the order of 0.5 to 5 miles, depending on the ground locations with respect to aircraft flight paths).

Figure 3.7-1 illustrates the magnitude of time-integrated noise measure, L_{dn}, for a variety of specific locations. It also shows that small towns would fall in the range from 45 to 55 dB. The dominant source for this background noise is normally automobile or truck traffic.

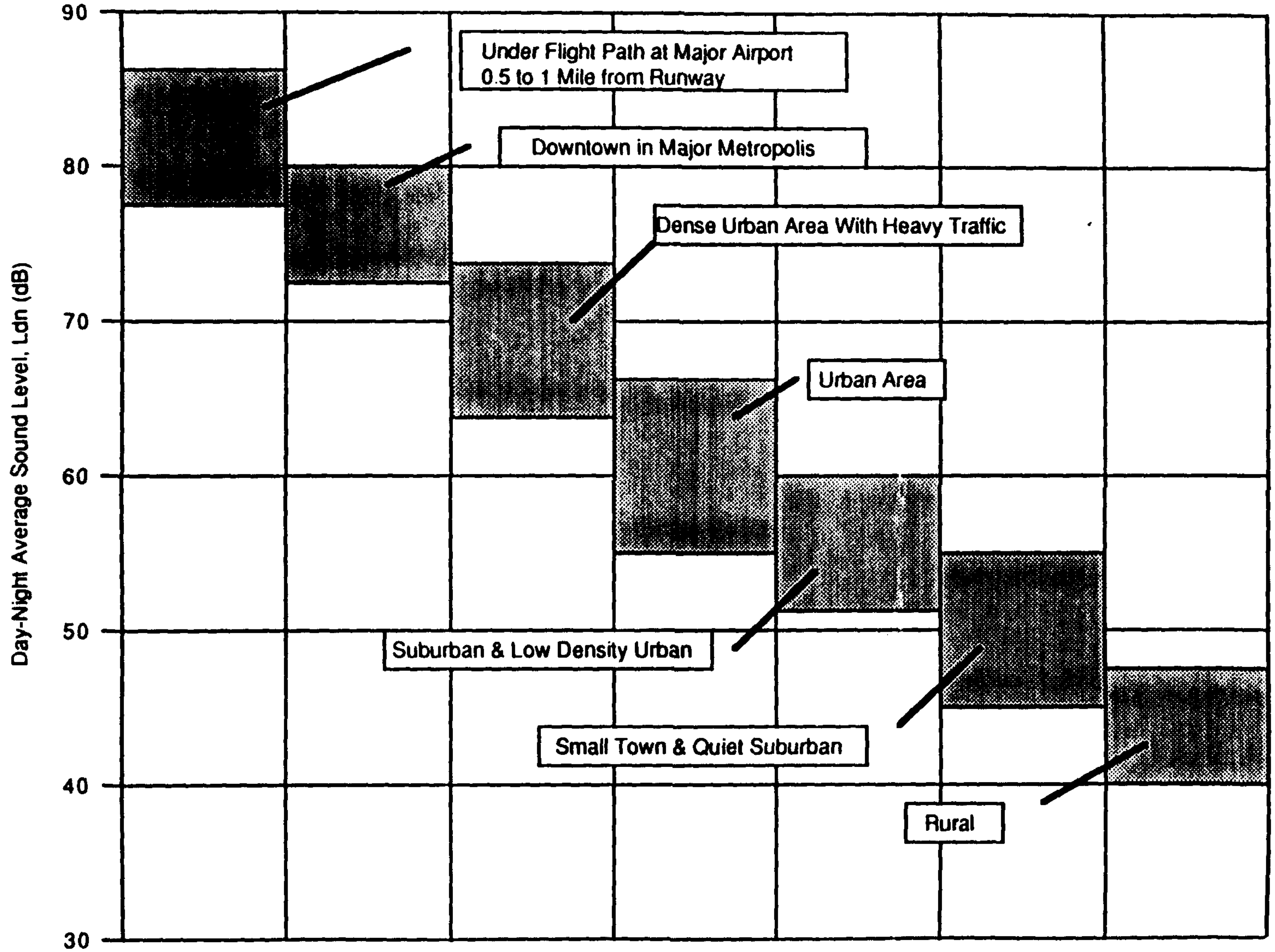

Figure 3.7-1. Typical day-night average sound levels (Ldn) at various localities (*modified from AFR 19-10*).

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The L_{dn} noise descriptor provides only a single average noise level over the 24 hours in a day. The actual hour to hour or moment to moment variation in outdoor noise level can be quantified, as shown in Figure 3.7-2.

3.7.3 WILDERNESS STUDY AREAS: SOUND LEVELS

The land space occupied by the UTTR is high-country desert in which the acoustic environment is described as remote rural. Numerous Wilderness Study Areas (WSAs) have been designated in this area (see Section 4.4). Very few detailed acoustic measurements have been made in such remote environments. Some of those that have are summarized in Table 3.7-1. On the basis of these measurements, the annual average ambient L_{dn} for WSAs in the UTTR is expected to be within a range of 33 to 40 dB in the absence of aircraft. (The data for the Florida Everglades are not considered applicable due to the contribution of insect noise not characteristic of the UTTR.)

The important natural sources of noise in WSAs on the UTTR are insect and wildlife activity, wind through the trees, and wind and atmospheric turbulence in the absence of any ground cover or vegetation. This last source will tend to form a lower limit on outdoor noise levels in open, remote areas without vegetation, and it has a value of about 25 dBA for wind speeds of about 1 mile per hour (mph); it increases by about 6 dB for every doubling of wind speed. In addition, WSAs in the UTTR also experience noise due to existing aircraft and other human activity.

3.7.4 BACKGROUND NOISE LEVELS IN AREAS OF OTHER SENSITIVE RECEPTORS

In areas that may be inhabited by any threatened or endangered species of wildlife or domestic animals, the range of noise levels

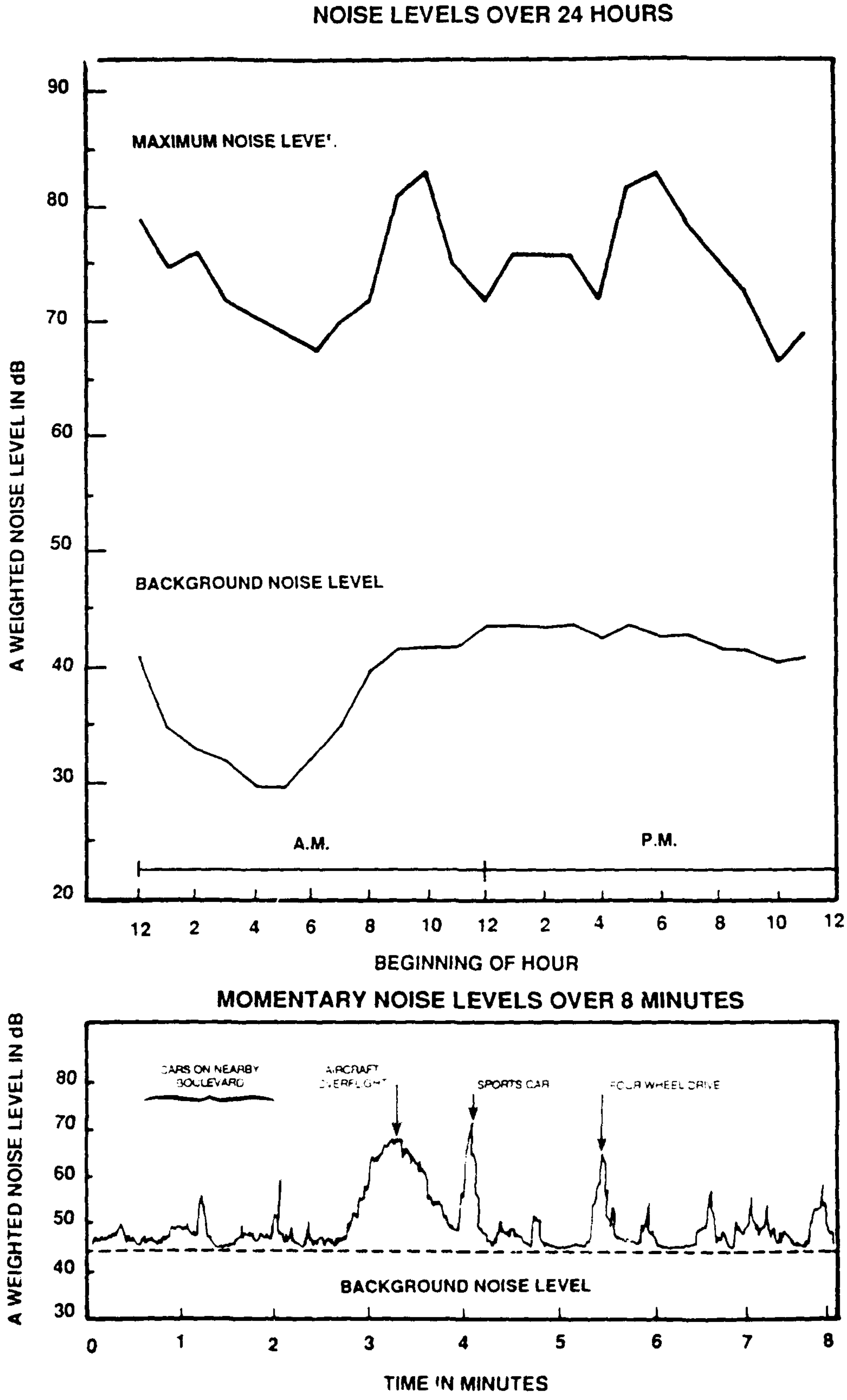

Figure 3.7-2. Outdoor noise in a normal suburban neighborhood.

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Table 3.7-1. Ambient sound levels in selected national parks.

Site	Daytime hourly L_{eq}[a]	Nightly hourly L_{eq}	Estimated L_{dn}	Ref.
North Rim of Grand Canyon	39	32	40.4	7
Grand Teton National Park	32	24	32.9	8
Florida Everglades	45	(37)[b]	(45.9)[b]	9
Canyonlands National Park	38	30	38.9	10
Mean	38.5	30.8	39.5	
Standard Deviation	5.3	5.4	5.3	

[a] L_{eq} average noise level for period specified.

[b] Nighttime L_{eq} estimated from difference between daytime L_{eq} values for other three sites; L_{dn} estimated from the measured daytime L_{eq} and the estimated nighttime L_{eq}.

will be similar to those described in the preceding section. Ambient background noise levels tend to be set by wind-induced noise and insect noise. Noise impact from existing intrusive sources in such areas will vary widely. The noise sources are activity of hikers or campers in the area; vehicle noise from distant roads; noise from recreational vehicles that may be allowed access to the area; and noise from military, commercial, and general aviation aircraft overflights. These noise intrusions will increase the background noise levels for relatively short periods and may contribute significantly to 24-hour average noise levels.

3.8 LAND USE

3.8.1 DEFINITION OF RESOURCE, ISSUES, AND CONCERNS

Land use addresses the various ways that lands in western Utah are used. These uses include cattle and sheep grazing, mining, and recreation. Included in this section are the visual resources comprising the natural features that give the landscape its aesthetic qualities.

Utah's west desert is a remote area with few people and few paved roads. Cattle and sheep ranches and small clusters of houses occur in Snake and Whirlwind valleys. Tule Valley is uninhabitated.

Implementation of the ECTC has the potential to affect current land users in west-central Utah, particularly in the areas of grazing, recreation, and mining. Moreover, the visual resources of the area could be affected by the widely-spaced ground disturbances associated with the program.

3.8.2 LAND OWNERSHIP

The pattern of land ownership in west-central Utah and eastern Nevada is shown in Figure 3.8-1. Public lands administered by the Bureau of Land Management (BLM) comprise the largest acreage of land in the region. These lands are managed according to multiple-use principles that were established in the Federal Land Policy and Management Act (FLPMA) of 1976.

A portion of the UTTR, including Dugway Proving Ground, is withdrawn for the Department of Defense (DOD) and used for purposes of national defense.

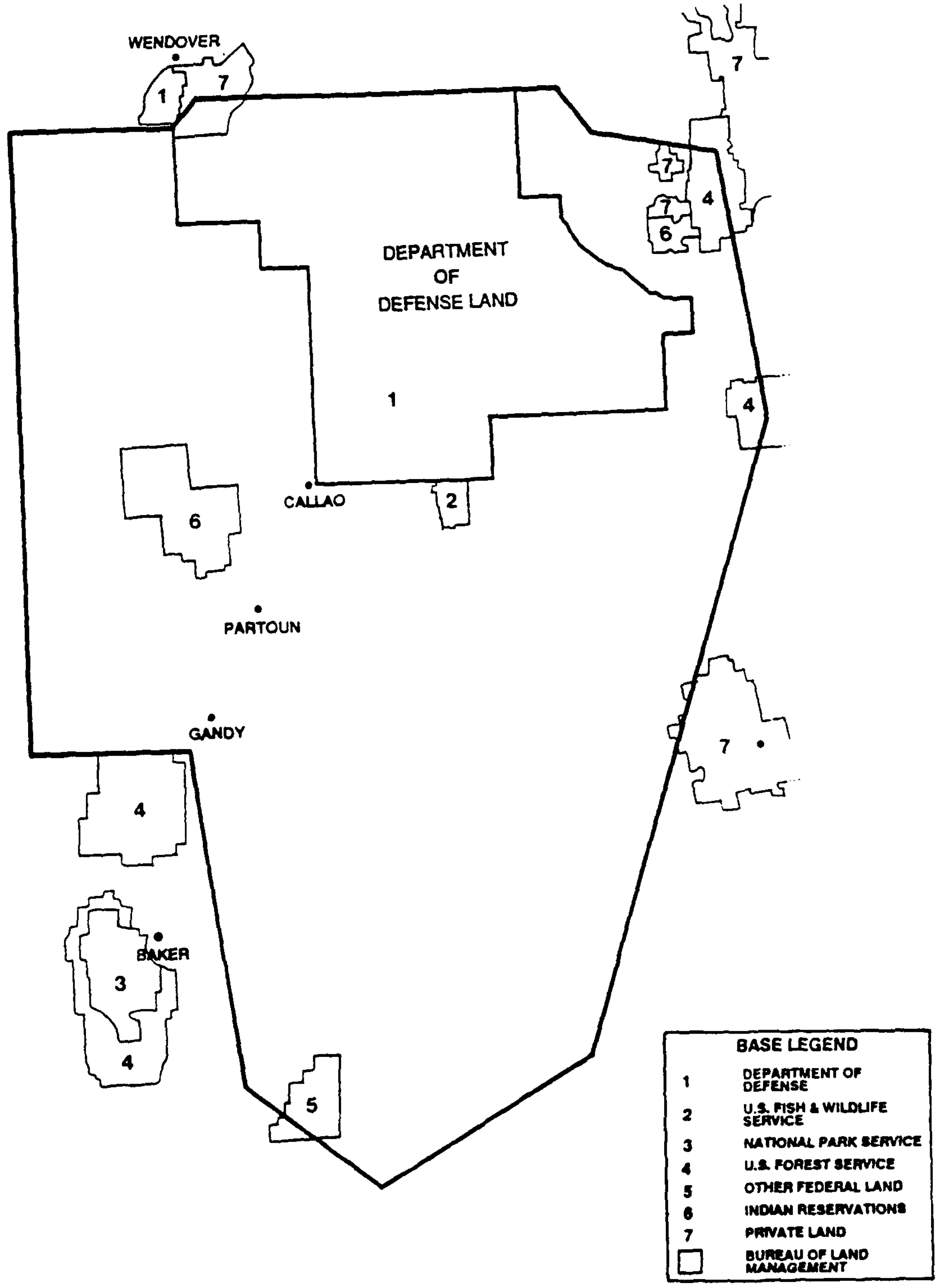


Figure 3.8-1. The pattern of land-ownership in west-central Utah and eastern Nevada.

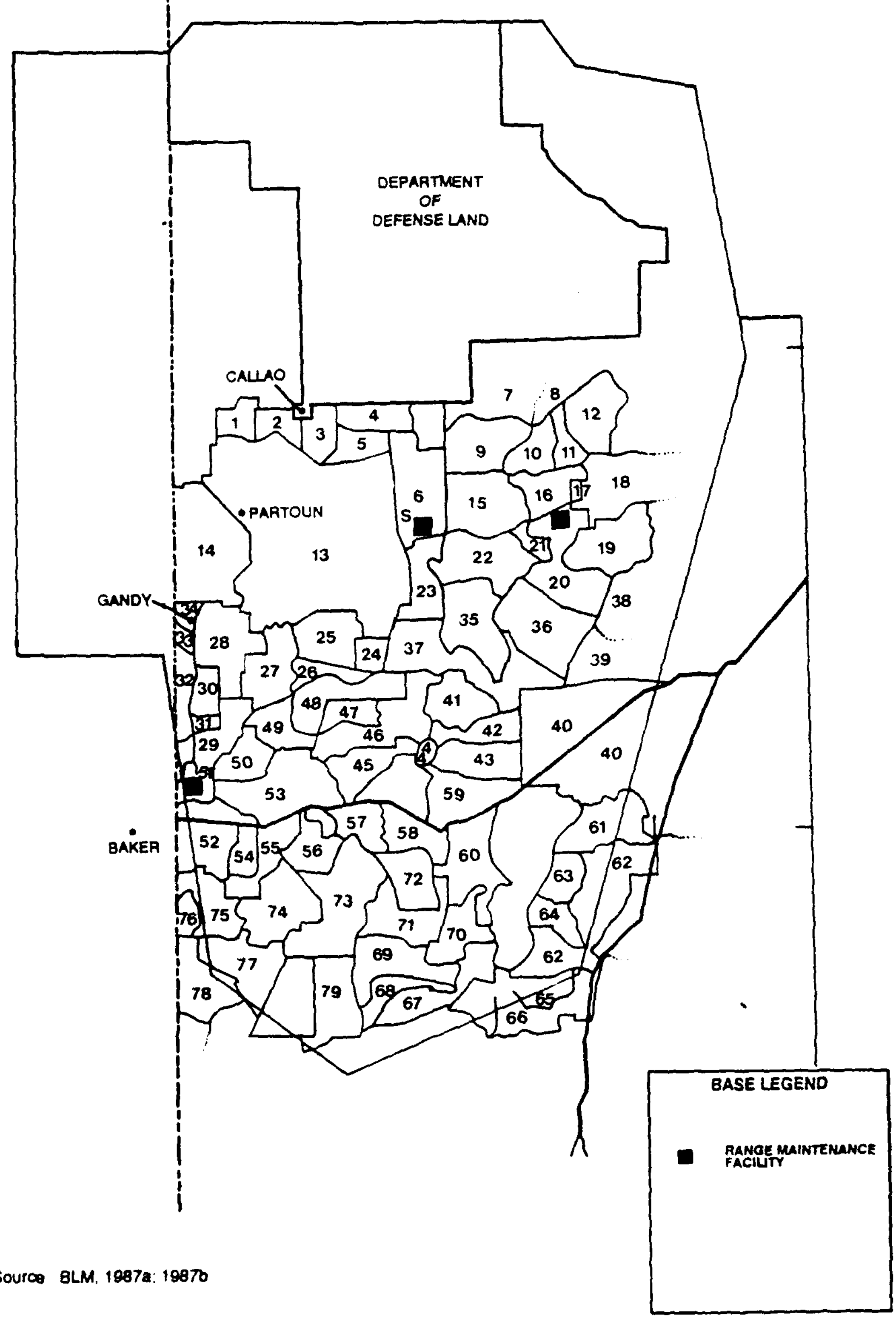
These lands are closed to public access. Within each of the 36-square-mile townships of public land in west-central Utah, the State of Utah owns four sections, each one square mile in size. These are generally sections 2, 16, 32, and 36.

Other lands in the vicinity of the ECTC program include Fish Springs National Wildlife Refuge, administered by the U.S. Fish and Wildlife Service (USFWS); Great Basin National Park, administered by the National Park Service; U.S. Forest Service lands; the Goshute and Skull Valley Indian Reservations; and scattered private lands that primarily are clustered chiefly near small towns throughout the region.

3.8.3 GRAZING

Cattle and sheep are grazed over much of the public land in the vicinity of the ECTC project. In the BLM's Richfield District, which comprises all of west-central Utah, including Tule, Snake, and Whirlwind valleys, 293 permittees graze livestock on 164 allotments that cover more than 4.2 million acres (BLM, 1987a; 1987b). Figure 3.8-2 shows the distribution of grazing allotments in the affected area (BLM, 1987a; 1987b). Most grazing occurs during the late fall, winter, and early spring.

The objective of the BLM's 20-year grazing plan in the Richfield District is to achieve and maintain a livestock production goal of 263,100 animal unit months or AUM (BLM, 1987a; 1987b). An AUM is the amount of forage required to sustain one cow for one month or to sustain a cow's equivalent (such as 5.1 sheep or 9.6 antelope) for one month. To help achieve this goal,the BLM has given top priority to water developments throughout the region such as wells, reservoirs, and catchments (guzzlers).



Source BLM, 1987a; 1987b

Figure 3.8-2. Distribution of grazing allotments in the affected area.

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FIGURE 3.8-2. Number key to livestock grazing allotments (Continued).

1. Mountain
2. Callao Bench
3. Callao
4. Trail Herds
5. Boyd Station
6. East Fish Springs
7. Black Rock
8. Fandangle
9. Wild Horse
10. Bitner Knoll
11. Flint
12. Table Mountain
13. Thousand Peaks
14. Partoun
15. Spor Mountain
16. East Topaz
17. Kane Spring
18. Riverbed
19. Crater
20. Lady Bird
21. Freighter
22. Swasey Knoll
23. Sand Pass
24. Tule Valley
25. Coyote Knolls
26. Tule Springs
27. Cowboy Pass
28. Gandy
29. Knoll Springs
30. Smith Creek
31. Henry Creek
32. Marble Wash
33. Devils Gate
34. Warm Creek
35. Tatow
36. Little Drum
37. Antelope
38. Smelter Mountain
39. Chalk Knolls
40. Deseret
41. Death Canyon
42. North Canyon
43. Klondike
44. Amasa
45. Printer Springs
46. Grainite
47. Ledger Canyon
48. Skunk Springs
49. Brown's Wash
50. Buckskin
51. Smith Creek
52. Garrison
53. Conger Springs
54. Ferguson
55. Crow's Nest
56. Boob Canyon
57. King
58. Blackham
59. Notch Peak
60. Skull Rock
61. Seely
62. Crickett
63. Coates
64. Wheeler
65. Ephraum-Bagnall
66. High Rock
67. Lawson Cove
68. Voorhees
69. Crystal
70. Steamboat
71. Painted Pothole
72. Blind Valley
73. Breck's Knoll
74. Deadman's Wash
75. Clay Springs
76. Pruess Lake & Big Wash
77. Morman Gap
78. State Line
79. Pine Valley

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Range land prices beginning in the early 1970's until 1978 were slowly increasing in west-central Utah. From 1978 until 1980 they remained fairly constant. From 1980 to 1983, speculation based on the possibility of siting the MX project in western Utah drove land prices in the west desert to more than double their 1980 values. By 1988, land prices were back to the 1980 level. Ranch and grazing land during the early 1980s, with no water or improvements of any kind, was selling for $400-500 per acre. Today, this same land sells for $50-75 per acre.

3.8.4 MINING

Active mining operations in the vicinity of the ECTC program, along with the location of areas of known mineralization (mining districts), are shown on Figure 3.8-3 (Wong, 1981; Schilling, 1976; Bonham, 1986; Jones and Papke, 1984). Current mining operations are limited to gold, silver, beryllium, limestone, potash, and fossils. Much of Utah's west-desert is prospectively valuable for base and precious metals, industrial minerals, and geothermal energy.

3.8.5 RECREATION

Numerous parks and recreation areas are located in the counties that would be affected by the ECTC program. Relatively few of these areas, however, are located within or adjacent to the South Range.

Most of the recreation areas in White Pine County and Elko County, Nevada are within the Humboldt National Forest, Ruby Mountains, and Great Basin National Park, a total of 370,665 acres of

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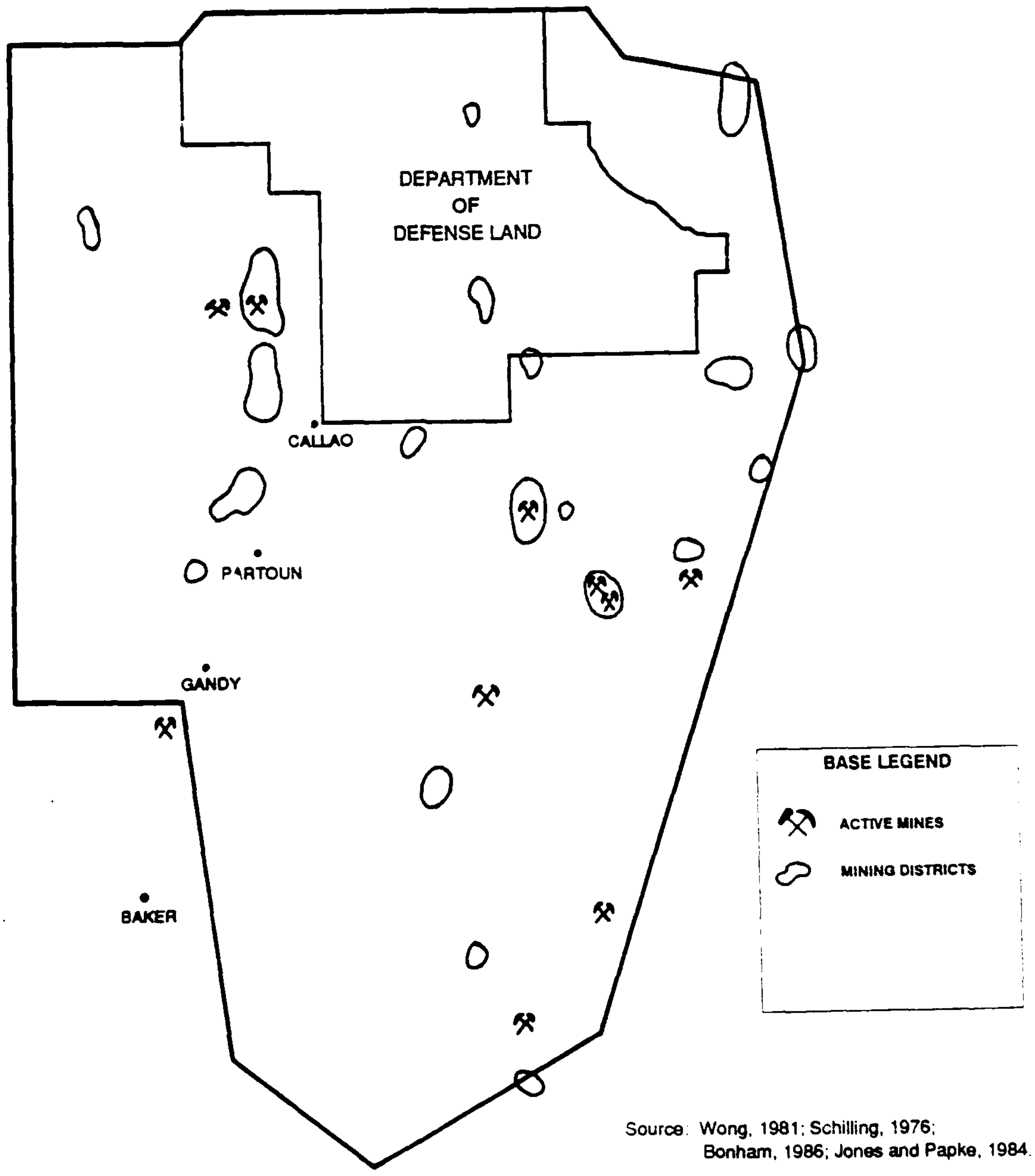

Figure 3.8-3. Active mining operations in the vicinity of the ECTC program, along with the location of the areas of known mineralization.

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recreationally administered land (SCORP, 1987). The 1987 Nevada Statewide Comprehensive Outdoor Recreation Plan (SCORP) indicates that the highest participation in outdoor activities for these regions is in fishing, hunting, and hiking/walking. The larger share of Nevada's dispersed recreational activities takes place in Elko County: 15.2 percent of the state's fishing, 24.3 percent of the hunting, 11.4 percent of the primitive camping, and 10.7 percent of the backpacking (SCORP, 1987). Both the Elko and White Pine County planning regions are currently meeting most recreational demands; however, any large increase in population could create a need for more facilities.

Approximately 70 recreation areas and parks are located in the Utah five-county area encompassing the ECTC region of influence. These areas comprise about 237,000 acres of Federal- or state-administered lands (Henningson et al., 1980). The primary recreational opportunities inside the program area are those associated with Wilderness Study Areas (WSAs) where hunting, fishing, camping, hiking, and some cave exploration are the highest use activities. Because of their widely varied degree of accessibility, resource development, and proximity to major population centers, use of these WSAs ranges from 50 visitor-days a year at Fish Springs and Howell Peak to 396,000 for Rockwell (east of the program area), where the Little Sahara area is the principal attraction. The Deep Creek Mountains have over 3,000 visitor-days per year, and the remaining WSAs vary between 150 and 380 visitor-days per year (BLM, 1986b).

Two important mineral and fossil collecting areas exist within the ECTC area. Topaz Mountain offers some of the finest topaz crystals in the United States, while Antelope Springs is an outstanding trilobite fossil collecting locality.

The higher usage recreation opportunities to the north and east of the ECTC area center on the Deer Creek, Utah Lake, and Great Salt Lake, where boating, swimming, picnicking, and fishing are popular. The combined visitor use of these areas is around 2,000,000 visitations per year. Other major recreational areas in this region include Simpson Springs, Camp Floyd, and the Wasatch and Fish Lake national forests, where camping, hunting, fishing, picnicking, and pleasure driving are popular. Combined visitor use for these areas exceeds 150,000 annually (Henningson et al., 1980).

Visitor use of all Utah outdoor recreational areas is expected to increase at the rate of two percent a year based on the Utah Outdoor Recreation Agency and Office of Planning and Budget projections (BLM, 1986b). While surveys conducted by the Division of Parks and Recreation indicate an overall adequacy of recreation facilities in the state, a need has been recognized for additional development of camping and picnic sites, boating facilities, and swimming beaches (SCORP, 1987).

3.8.6 VISUAL RESOURCES

The scenery in west-central Utah consists of broad, open valleys and playas, rolling hills and buttes, and rugged, high mountains. Vegetation in low-lying areas is largely shadscale. Pinion, juniper, and sagebrush are conspicuous on slopes extending up from the valley floors. Aspen and several species of pine grow on the higher mountains.

Because much of the area potentially affected by the ECTC program is public land, the BLM's visual resource management (VRM) planning system will be used to establish the baseline from which visual impacts caused by the ECTC program are judged (BLM, 1987a; 1987b). The BLM VRM system categorizes visual resources into five classes, ranging from very high quality (VRM Class I) to very low quality

(VRM Class V). No areas in the vicinity of the ECTC program are considered either Class I or Class V by the BLM. As shown in Figure 3.8.-4, most areas are categorized as Class IV; relatively few are considered Class III, and fewer still Class II. The BLM's policy in managing visually sensitive areas, such as Class II and Class III areas (especially in the foreground), is to require appropriate stipulations on planned developments to mitigate visual impacts.

The BLM conducts a "visual resource-contrast rating" for all major projects proposed on public lands that have the potential to affect VRM Classes I, II, or III (BLM, 1986). The rating system is used as a guide to ensure that every attempt is made to minimize potential visual impacts caused by a major project.

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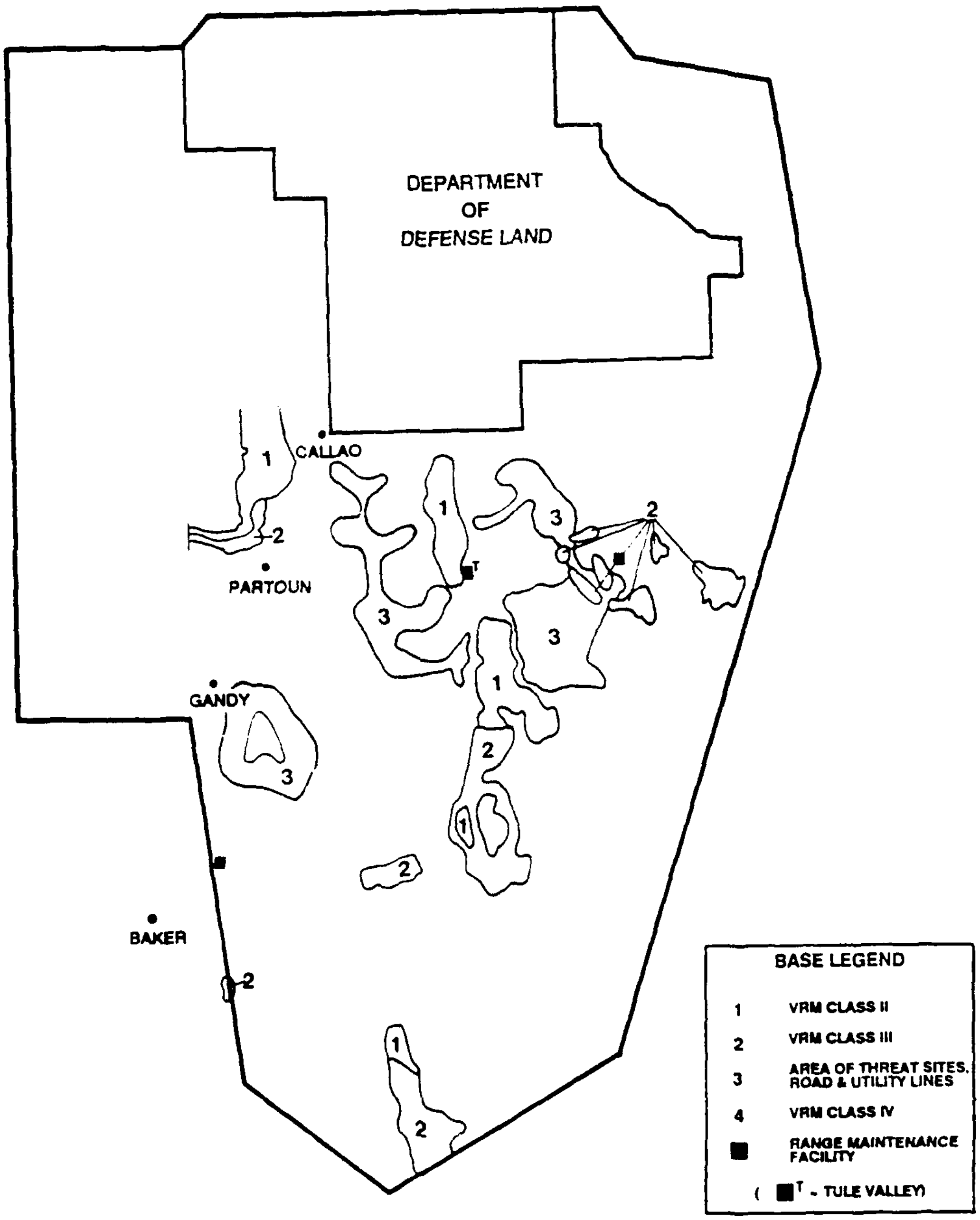

Source: BLM, 1987a; 1987b.

Figure 3.8-4. BLM visual resources classifications in the ECTC program area.

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3.9 SOCIOECONOMICS

3.9.1 DEFINITIONS, ISSUES, AND CONCERNS

Socioeconomics encompasses such interrelated resources as population, employment, income, temporary housing, public finance, and services provided by public and private entities, such as utility companies and schools.

Temporary housing refers to the availability of hotel and motel rooms within the local area of the program. Public finance concerns the financial status of local government entities, including counties, cities, townships, schools, and special districts. Financial status is a function of revenues, expenditures, debt, bonding and tax limitations, and bond ratings on existing debt obligations.

3.9.1.1 <u>The region of influence (ROI)</u>

Socioeconomic issues of the ECTC project stem from the potential for demographic and economic changes to occur from construction and operation of ECTC facilities. The ROI for socioeconomic issues encompasses 13 counties, including 11 in Utah and 2 in Nevada (Figure 3.9-1). The size, distribution, and source of the ECTC work force can affect employment opportunities, population, transportation, housing, community services and facilities, local government and public finance, and community lifestyles. The ROI incorporates those areas where these impacts would be concentrated. These are areas where direct and indirect project workers would be apt to reside and spend most of their income, and where goods and services would likely be procured during both construction and operation of the ECTC. The effects of changes in economic activity

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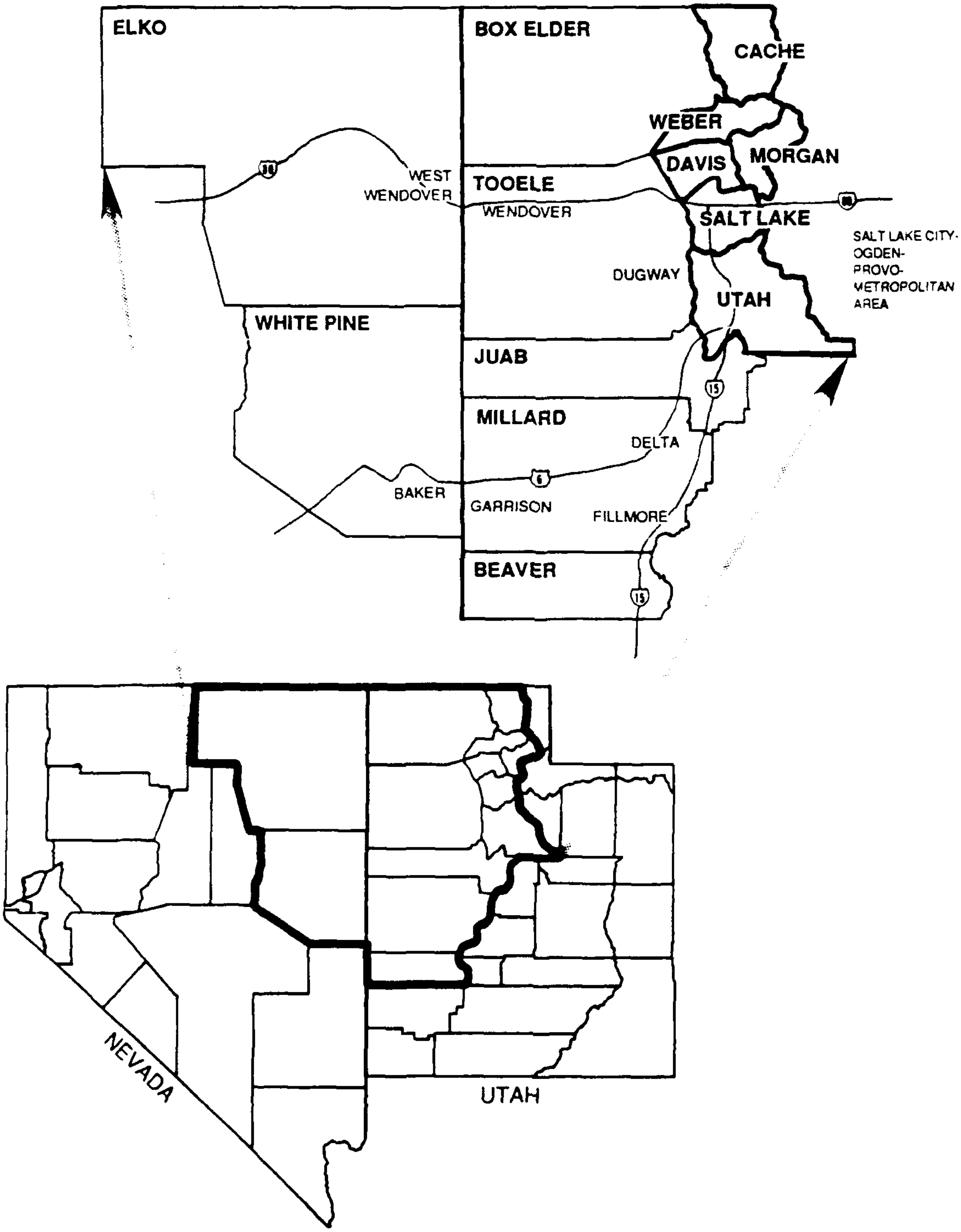

Figure 3.9-1. Counties and subcounty areas within the ECTC region of influence.

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within regions and their localities depend upon the relative magnitude of the changes to the current regional market for labor and materials. Thus, the ROI is the chief unit of analysis for economic issues such as project-related direct and secondary expenditures, employment, and income.

3.9.1.2 Counties

Population-related socioeconomic issues arise in selected local geographic areas because of the relationship between potential project locations, the size of the associated workforce, the existing population distribution, and transportation characteristics. These demographic issues are most important within four counties: Tooele and Millard in Utah, and Elko and White Pine in Nevada. Although project-related population increases are not likely to be large, Juab County is also described in economic and population terms because of its location with respect to major project features.

3.9.1.3 Communities

Communities most likely to experience in-migrating workers (Wendover, Dugway, Delta, Fillmore, Garrison, West Wendover, Baker, and Ely) are not large compared to potential population increases under various alternatives. As a result, selected socioeconomic issues may arise in these counties when viewed in terms of existing service capacities.

The following sections describe socioeconomic conditions in the region of influence for affected counties and communities.

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3.9.2 ECONOMICS

Service, trade, and manufacturing-sector employment in the ROI generally is concentrated in the Salt Lake City-Ogden-Provo metropolitan area along the I-15 corridor. The economies in the rural areas to the west are generally supported by farming, ranching, mining, and military activities. Recreation and tourism are important to Wendover, West Wendover, and the southern areas of the ROI, while the Federal government plays an important role in the central part of the ROI. Planned economic development includes the APTUS and USPCI hazardous waste incineration projects and mission increases at the Tooele Army Depot in Tooele County, the Thousand Springs Power Project in Elko County, and a state prison and the White Pine Power Project in White Pine County.

Total employment in the ROI was approximately 730,000 jobs in 1986. This employment grew at an average annual rate of 3.6 percent over the 1969-1986 period (U.S. Bureau of the Census, 1988), compared to 2 percent national employment growth per year during this period. Mining industry employment grew throughout the 1970s, but recently suffered declines through the mid-1980s. Jobs in the gold-mining industry have increased recently in the two Nevada counties.

Personal income per capita in the ROI was approximately $12,100 in 1986, substantially less than the U.S. average of $15,800. Income per capita for individual counties ranged from a low of $8,800 in Juab County to $14,500 in Elko County (U.S. Bureau of the Census, 1988).

The unemployment rate in the ROI measured 4.6 percent in 1988, compared to a national rate of 5.5 percent. Unemployment rates in the ROI have been consistently lower than national averages since

the mid-1970s (Utah Office of Planning and Budget, 1988; Sargent, pers. comm., 1989; and Clarke, pers. comm., 1989).

3.9.3 POPULATION

The ROI had an estimated 1988 population of 1,571,000 (Nevada Governor's Office of Community Services, 1988; Utah Economic Coordinating Committee, 1989). Approximately 72 percent of the population of the ROI in 1988 was concentrated in Davis, Morgan, Salt Lake, Tooele, and Utah counties (Wasatch Front counties) (Figure 3.9-2), with most of the population concentrated in the Salt Lake City-Ogden area. The remaining six Utah counties made up 26 percent of the ROI population, with the majority of people living in the Provo-Orem area. The two Nevada counties are sparsely populated rural counties that comprised about two percent of total ROI inhabitants in 1988. Population of the ROI grew at an average annual rate of 2.5 percent between 1970 and 1988, and is projected by Nevada and Utah planning agencies to grow at an average annual rate of 1.5 percent between 1988 and 2000.

The State of Utah has demographic characteristics that are distinctly different from the rest of the nation. Utah has recently been growing faster than other states despite a large amount of net out-migration of the working-age population. Although Utah ranked ninth among all states in population growth between 1980 and 1988, net out-migration since 1984 is nearly 41,000. The increase in population was due to natural increases that offset the out-migration. Since 1984, however, decreases or slight population growth have occurred in the non-metropolitan counties of Tooele, Juab, and Millard Counties.

Elko and White Pine counties have distinctly different historic demographic trends. While Elko County had the largest net

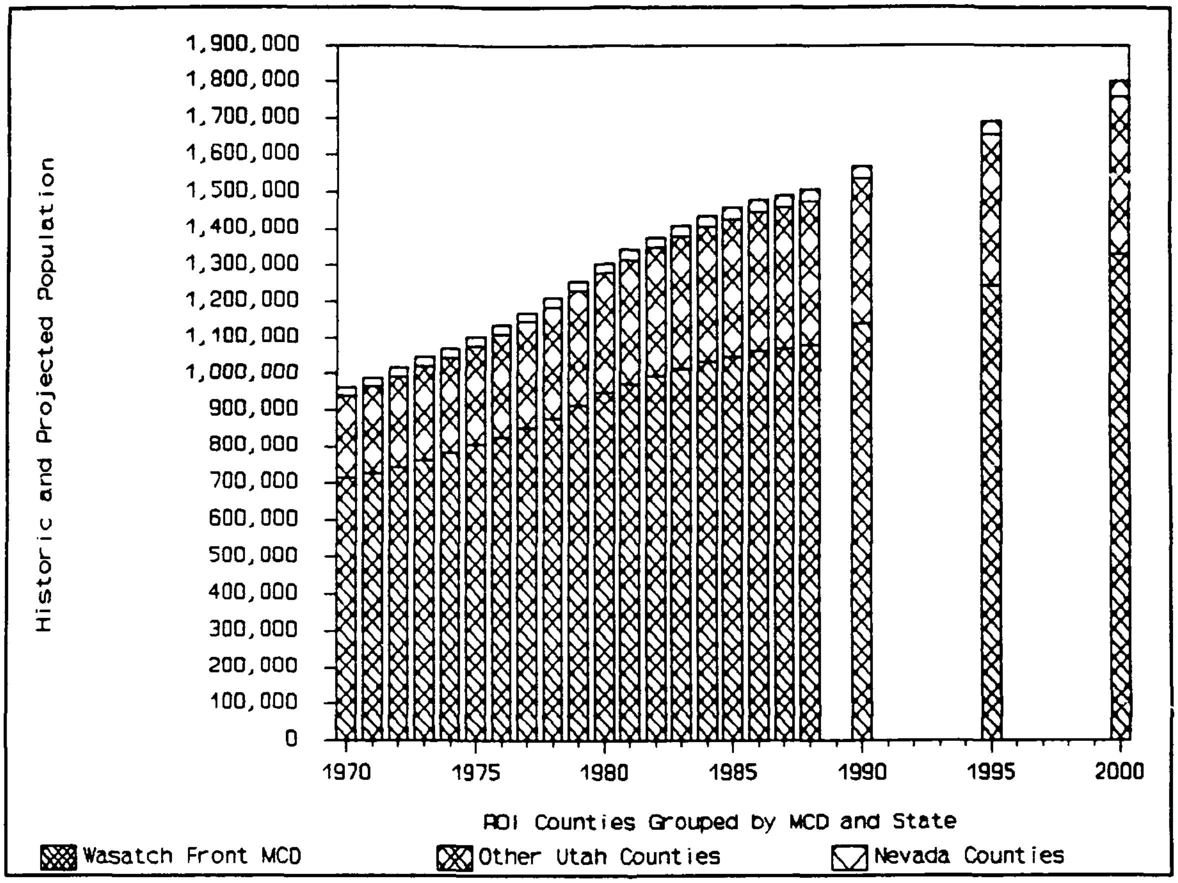

Figure 3.9-2. Historic and projected population in the ECTC region of influence (ROI).

population increase of the 15 rural counties in Nevada between 1980 and 1987, White Pine County was the only county in the state to register a decline in population during the period (Nevada Governor's Office of Community Services, 1988).

Table 3.9-1 shows the anticipated population growth through the year 2000 in Tooele, Millard, Juab, Elko, and White Pine counties, and selected communities within these counties.

Demographic trends for Tooele, Juab, and Millard counties in Utah and Elko and White Pine counties in Nevada are discussed in greater detail in the following sections.

3.9.3.1 Tooele County, Utah

Tooele County grew from 21,600 persons in 1970 to 28,300 in 1985, and has since declined to 27,800 in 1988. The county is expected to grow to 34,700 persons by the year 2000, which represents an average annual growth rate of 1.9 percent (Utah Economic Coordinating Committee, 1989).

The largest city in Tooele County is Tooele (1986 population of 15,760), and the second largest city is Grantsville (1986 population of 5,130). Dugway (1986 population of 1,700) is the military community located on Dugway Proving Ground.

Wendover is the only incorporated city in western Tooele County. It was the fastest growing city in the county between 1980 and 1986, growing from 1,100 to 1,679 at an average annual rate of 7.2 percent.

The population of Tooele County's unincorporated area has grown slowly, from 5,160 persons in 1980 to 5,580 persons in 1986, for

Table 3.9-1. Projected change within the region of influence.

County Community	1990	1993	1996	2000
Tooele	28,800	30,500	32,200	34,700
Wendover	1,650	1,750	1,850	2,000
Dugway	1,750	1,750	1,750	1,750
Juab	5,800	5,900	6,200	6,200
Millard	12,700	12,300	12,000	11,600
Delta	3,150	3,050	3,000	2,900
Fillmore	2,500	2,450	2,400	2,300
Garrison	20	20	20	20
Elko	27,800	29,300	31,000	33,300
West Wendover	2,600	2,700	2,900	3,100
White Pine	8,200	8,300	8,500	8,700
Ely	4,700	4,800	4,900	5,000
Baker	190	195	200	205

Sources: County projections from the Utah Office of Planning and Budget, 1988; Nevada Governor's Office of Community Services, 1988.

Community projections estimated from 1986 county shares and local sources.

an average annual rate of 1.3 percent. In 1986, the population density of unincorporated Tooele County was 0.6 persons per square mile. Many of these residents live in unincorporated communities along the transportation network in the eastern part of the county.

Unincorporated population centers in western Tooele County include Ibapah (population 30), Gold Hill (population 10), and Salt Springs; they are located to the west and north of the Deep Creek Mountains (north of Tule, Snake, and Whirlwind valleys).

3.9.3.2 Juab County, Utah

The rate of population growth in Juab County was less than half the average growth rate of the ROI and the state of Utah during the 1970 to 1988 period. The state has projected very little population growth in the county between 1988 and 1995, and no growth at all between 1995 and 2000. Juab County's population grew by 1,100 persons between 1970 and 1988, from approximately 4,600 to about 5,700, at an average annual rate of 1.2 percent. Population growth in the county was estimated by the state to average about 0.6 percent between 1988 and 2000, to reach 6,150 residents.

Nephi, with a 1986 population of 3,560, is the largest city in the county, and the only community with a population of more than 700 persons. Nephi increased in population by approximately 285 persons between 1980 and 1986.

The population of Juab County's unincorporated area decreased from 586 persons in 1980 to 560 persons in 1986. The population density for the unincorporated area of Juab County was 0.2 persons per square mile in 1986. Many of these rural residents live in communities along the major highways in eastern Juab County. Western Juab County residents live predominately in widely

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separated population centers such as Callao (population 30), Trout Creek (population 4), and Partown (population 4) in Snake Valley; Uvada (population 6) and Six Mile Ranch to the west, and Fish Springs (population 10) in Whirlwind Valley. Goshute (population 150), located on the Goshute Indian Reservation, is adjacent to Western Juab County.

3.9.3.3 Millard County, Utah

The population of Millard County has grown at a faster pace than the state between 1970 and 1988. Millard experienced a substantial increase in population in the early 1980s. The county grew from 9,050 persons in 1980 to 14,200 in 1985, recording an average growth rate of 9.4 percent annually for that period. Much of this population growth was attributable to an influx of workers for construction and operation of the Intermountain Pcwer Plant (IPP), located 12 miles from Delta. Since 1985, the county has declined in population and the state projects a further decline through 1990 and only slight population growth through the end of the century (Utah Economic Coordinating Committee, 1989).

In 1986, the largest cities in the county were Delta (population 3,530) and Fillmore (2,800). Each of these communities recorded relatively substantial population increases between 1980 and 1986. Delta grew at an average annual rate of 10.6 percent and Fillmore had an average annual growth rate of 5.1 percent. There are eight other cities in the county, each with populations of less than 1,000 persons in 1986, and all of which experienced relatively large population gains between 1980 and 1986. The fastest growing of the eight small communities were Leamington (1986 population of 240, 1980-1986 average annual growth rate of 13.4 percent), Hinckley (population 940, growth rate 12.5 percent), Oak City (population 790, growth rate 12.5 percent), Holden (population 600, growth rate 8.7 percent), and Lynndyl (population 140, growth rate

7.6 percent). The remaining cities experienced considerable growth relative to their size: Scipio (population 340, growth rate 4.8 percent), Meadow (population 320, growth rate 3.2 percent), and Kanosh (population 510, growth rate 2.7 percent).

The population of the county's unincorporated area also grew from 2,580 persons in 1980 to 3,990 persons in 1986, for an average annual rate of 7.5 percent. The density of Millard County's unincorporated area was 0.6 persons per square mile in 1986. As with other counties in this region, the transportation network is more developed among the communities along the base of the Wasatch Mountains. Population centers in unincorporated western Millard County include Gandy, Robinsons Ranch, Eskdale (population 30), and Garrison (population 30) in Snake Valley.

3.9.3.4 Elko County, Nevada

Elko County nearly doubled in population between 1970 and 1988, growing from approximately 14,000 persons to about 26,000 at an average annual rate of 3.4 percent. The state has projected population growth in the county to average about 2.2 percent between 1988 and 2000, eventually reaching about 33,300 residents.

Elko, the county seat, is the largest city in the county with a 1987 population of 13,310. Since 1980, the community has experienced an increase of more than 4,500 persons.

The population of Elko County's unincorporated area has grown from 6,060 persons in 1980 to 8,670 persons in 1987, for an average annual rate of 5.2 percent. The population density of rural Elko County was 0.5 persons per square mile in 1988.

West Wendover is an unincorporated community that had a 1980 population of fewer than 400 persons. By 1988, West Wendover's

population was about 2,500 persons due mainly to the construction of three new casinos and related housing to accommodate the casino workers (Boucher, 1989).

3.9.3.5 White Pine County, Nevada

The population of White Pine County has recently declined to the lowest levels since before the 1920s (Nevada Governor's Office of Community Services, 1988). The 1988 population was approximately 8,200 persons and the state has projected population growth in the county to average about 0.5 percent between 1988 and 2000 to about 8,700 residents.

Ely is the largest city in the county with a population of 5,000 in 1987. The community had approximately 5,200 persons in 1983, but declined to about 4,500 persons by 1985. There are no other incorporated cities in the county. Baker is an unincorporated community near Great Basin National Park. Baker's 1988 population of fewer than 190 persons is approximately the same as reported in the 1980 census. The unincorporated population density of White Pine County was 0.2 persons per square mile in 1988.

3.9.4 TRANSPORTATION

The Salt Lake-Ogden-Provo metropolitan area is a central hub for highway, rail, and air transportation in the mountain states. Interstate 15 (I-15) is the major north-south route, while Interstate 80 (I-80) is the major east-west route, through the ROI. The transportation network in the ROI is more fully developed in the eastern corridor paralleling I-15 than in western Utah.

Few paved roads extend east and west through the four counties making up the rural portion of the ROI. Unpaved roads are the normal travel network for local residents in the western portion

of Tooele, Juab, and Millard counties. The predominance of unpaved roads limits the ease of travel between the populated eastern regions of these counties and their more rural western regions.

Three major interstate railroads serve the Salt Lake metropolitan area: Denver and Rio Grande; Southern Pacific; and the Union Pacific.

The major airport in the ROI is Salt Lake City International (SLC), which provides international, domestic, and commuter air service as well as general aviation. There are 12 other general aviation airports and two military airfields in the region.

3.9.5 HOUSING

Housing within the ROI reflects the population distribution in the region. The five counties along Utah's Wasatch Front contained about 375,000 dwelling units in 1987, over 70 percent of the housing in the ROI, with most of the residences concentrated in the Salt Lake City-Ogden urban area. Within this urban area in 1987, about 52,500 and 55,216 housing units were located in Davis and Weber counties, respectively, where about 92 percent of Hill Air Force Base (AFB) employees reside. The housing supply in Davis, Salt Lake, and Tooele counties is expected to increase at an annual rate of 2.15 percent through the year 2010 (State of Utah, 1987).

The county areas outside the Wasatch Front contain over 25 percent of the ROI housing, with the majority located in the Provo-Orem urban area. The two Nevada counties contain about 2 percent of total ROI housing.

Table 3.9-2 shows the 1988 estimated housing supply and the expected demand through the year 2000 in Tooele, Juab, Millard,

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Table 3.9-2. 1988 regional housing stock and future demand.

County Community	1988 Stock	1990	1993	1996	2000
		Demand			
Tooele	9,150	8,930	9,440	9,980	10,740
Wendover	530	420	440	470	500
Dugway	1,120	600	600	600	600
Juab	2,200	1,800	1,830	1,870	1,920
Millard	3,950	3,860	3,760	3,660	3,540
Delta	1,250	960	940	910	880
Fillmore	800	790	770	750	720
Garrison	8	8	8	8	8
Elko	10,200	10,400	11,000	11,600	12,500
West Wendover	500	890	940	1,000	1,100
White Pines	3,400	3,060	3,120	3,170	3,250
Ely	2,160	1,760	1,790	1,820	1,870
Baker	70	70	70	75	75

(1) Housing stock was estimated from 1980 census data plus local building permits.
(2) Includes group quarters.
(3) Includes mobile home stock from growth period.
(4) Includes 550 hotel/casino rooms reserved for employees.

Elko, and White Pine counties. Similarly, the housing stock and demand projections are shown for the communities in these counties most likely to be affected by the ECTC program.

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3.9.6 COMMUNITY SERVICES AND FACILITIES

The following publicly provided services were reviewed for the rural counties in the ROI: education; law enforcement; fire protection; health care; water; wastewater; and solid waste. Where the county is the principal provider of services in a community, only that portion of county service to the community was investigated.

In general, the service infrastructure capacity in all communities in the rural counties is above the current demand due to recent declines or slight growth in population after the community response to the growth of the early 1980s. However, current capacities in the water supply for Wendover, Utah, and West Wendover, Nevada, and in educational facilities in selected communities are limited. The Wendover Pipeline Administration Authority provides water to Wendover and West Wendover. Currently, its delivery capacity to industrial users is limited by the pipeline size, which is most acute in Wendover, Utah. The Authority is planning to expand its delivery capacity (Forsberg, 1989). Educational services are currently being strained in selected individual schools in Tooele, Millard, and Elko school districts, and are described here in more detail.

3.9.6.1 Education

The ROI contains 21 school districts: 19 in Utah and 2 in Nevada. There were 376,032 students enrolled in these public school systems in October 1988. The Salt Lake City-Ogden and Provo-Orem metropolitan areas dominated the ROI with 286,971, or 76 percent, of the region's public school students (Utah State Office of Education, 1988; Nevada Department of Education, 1989). These metropolitan areas provide established public school systems that serve all aspects of public education.

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The 1987-88 student/teacher ratio for the ROI was 25.0, which is slightly lower than the average for the state of Nevada (student/teacher ratio of 25.7) but higher than the nation as a whole (18.0) (Nevada Department of Education, 1989; U.S. Department of Education, 1987). The state of Utah student/teacher ratio (24.9) was slightly less than that of the ROI (Utah State Office of Education, 1989).

Total employment in public education for the ROI was 18.47 full-time equivalent (FTE) employees per 1,000 population based on October 1982 employment data, compared with 18.67 for Utah, 15.86 for Nevada, and 18.44 for the United States (U.S. Bureau of the Census, 1984).

Current enrollment and capacity information for individual schools within each district were obtained from personal communication with administrators (usually principals) of each of the schools in Tooele, Millard, Elko, and White Pine counties. This information is presented in Figure 3.9-3. The figure shows enrollments vs. capacity in individual schools within the districts to illustrate the specific nature of this issue.

3.9.7 LOCAL GOVERNMENT AND PUBLIC FINANCE

The capacity to meet changes in the demand for community services and facilities is reflected in a local government's fiscal characteristics. Local governments are required to maintain balanced budgets and to limit borrowing to established limits. Fiscal capacity is illustrated through revenues and expenditures, fund balances, and ratios of indebtedness to borrowing capacity. Table 3.9-3 shows the 1988 financial condition of the rural jurisdictions in the ROI. Most of these jurisdictions maintain relatively strong fund balances. However, Wendover and Delta are

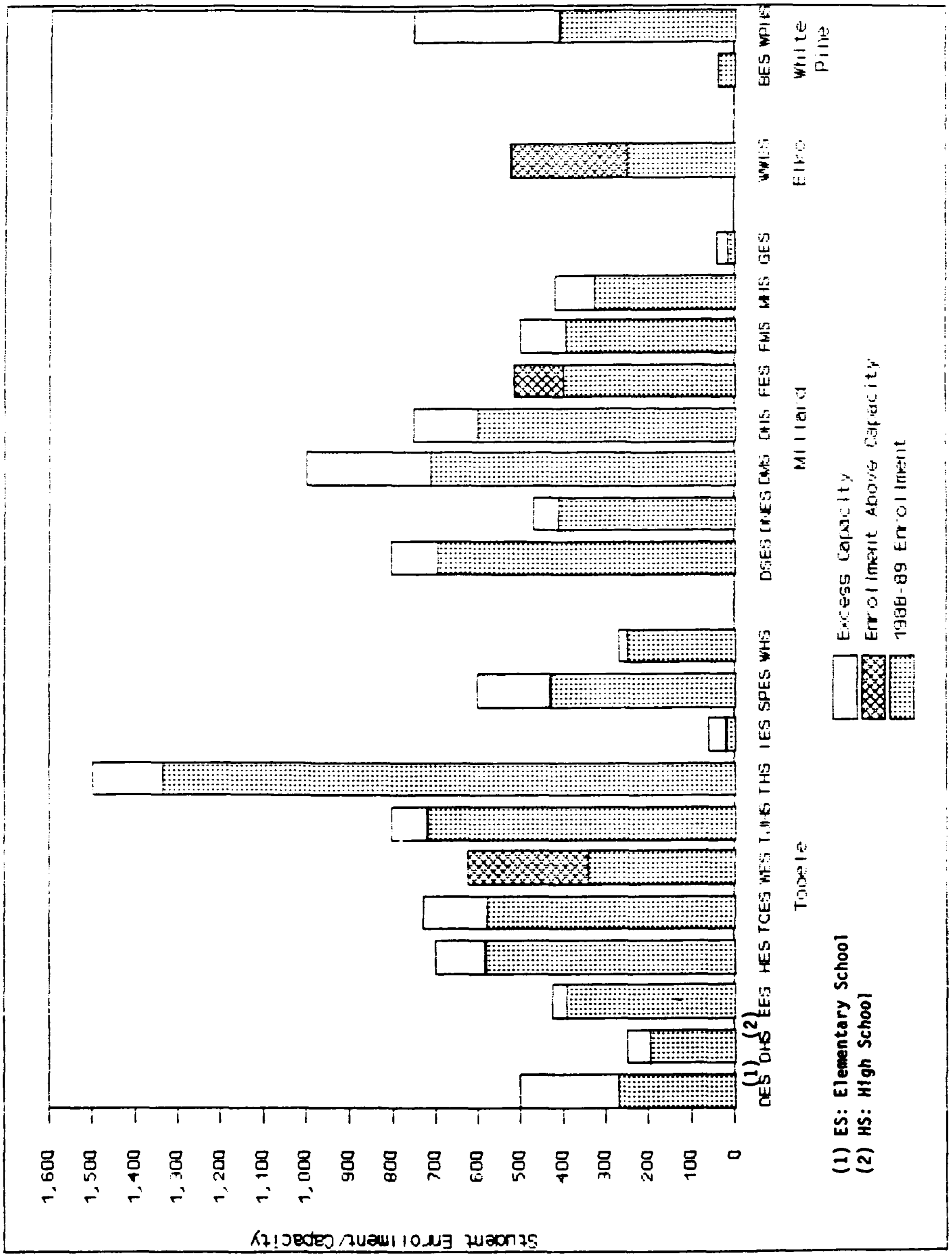

Figure 3.9-3. Principal's reported enrollments/capacity.

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Table 3.9-3. Revenues, expenditures, fund balances, and reserve bonding capacities of potentially affected rural counties ($1,000).

Jurisdiction	Revenues	Expenditures	Balance	Reserve Bonding Capacity
Tooele County	6,400	6,700	3,300	NA
Wendover	390	390	(70)	NA
Tooele County School District	16,900	16,600	1,100	15,000
Millard County	4,300	4,700	1,200	6,200
Delta	700	680	10	2,300
Fillmore	450	490	150	1,500
Millard County School District	8,500	8,600	610	5,700
Elko County	10,700	9,100	5,500	39,600
West Wendover	910	780	340	3,700
Elko County School District	19,500	19,000	970	61,000
White Pine County	5,000	4,700	1,200	7,500
White Pine County School District	5,700	5,600	850	15,300

Note: Data reflects actual revenues and expenditures of general funds of school districts. General and special revenue funds (where applicable are shown for cities and counties. All data are for FY 1988 except UTAH county data, which is FY 1987. Reserve bonding capacity is the established borrowing limit less the outstanding balance.

currently operating with few fund reserves, which may adversely influence community service levels in the future.

3.9.8 COMMUNITY ATTITUDES AND LIFESTYLES

The ROI includes a large metropolitan area, small rural incorporated towns, rural unincorporated population centers, and residents who live on farms and ranches throughout the unincorporated areas of each county. The rural population is widely dispersed west of Interstate-15 and the US-6 corridor in the eastern part of the ROI. Residents of western Utah travel to the rural incorporated towns over unpaved roads and by private aircraft due to the limited road network. While no specific field investigations related to community attitudes and lifestyles were undertaken for this EIS, some information regarding current attitudes and lifestyles is apparent in the ECTC scoping comments, discussions conducted during data collection, and news articles regarding the ECTC program.

Residents in the nonmetropolitan areas of the ROI, especially in Tooele, Juab, Millard, Elko, and White Pine counties, presumably live in these areas, in part, because they prefer small towns or isolated ranches and farms over metropolitan cities. Amenities they are likely to find beneficial include the natural quiet of rural areas, relatively free access to secluded public lands, and general lack of restrictions on travel across these lands. Recreational pursuits in rural areas, in general, are usually centered on outdoor activities, such as hunting, fishing, hiking, and off-road vehicles. Economic livelihoods are usually provided by mining, ranching, or farming, and by services related to these occupations. Lifestyles tend to revolve around occupation, family and, in the case of the rural areas of this ROI, the Mormon Church.

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In general, economic aspects (especially employment) associated with any new industrial project in the ROI and, especially, in the nonmetropolitan areas of the ROI, are considered beneficial by residents. Frequently, residents of small, relatively isolated communities express the belief that an increase in the number of jobs in their community will provide employment to children who would otherwise move to metropolitan areas to work. Other economic aspects often considered beneficial are improved community services and a stronger tax base. Many residents of small towns and rural areas, however, recognize that results of any new project on their lifestyles are neither all beneficial nor all negative, but require trade-offs between beneficial economic aspects and the rural amenities that are presumably the reason they live in such areas.

Rural residents in the ECTC program area express concern about the effects of current UTTR low-altitude flyovers. These concerns include noise, violations of overflight restrictions, and the removal of accessible public lands in western Utah for military purposes.

In general, increased employment associated with any new projects in the region is considered beneficial to the current economy. Rural residents, however, express concern about the current effects of low altitude flyovers, such as noise, violations of overflight restrictions and the potential for increased military use of public lands in western Utah.

3.10 WATER RESOURCES

3.10.1 DEFINITION OF RESOURCE, ISSUES, AND CONCERNS

Large amounts of water exist in the subsurface throughout west-central Utah. Discharge of this ground water to the surface occurs at widely scattered springs within the basins and mountains. With the exception of Fish Springs National Wildlife Refuge and streams in the Deep Creek Mountains, very little surface water exists in Tule, Snake, or Whirlwind valleys.

Water will be required for construction and operation of the ECTC. Ground water will eventually supply the water needs for all people and facilities on the range (RMF and threat sites). In the meantime, water will be trucked to the range facilities daily for construction and operations.

ECTC facilities located in cities and towns surrounding the range will obtain water from local municipal water-distribution systems. The availability of this water is discussed briefly in Sections 3.9 and 4.9 (Socioeconomics).

Before the Air Force can use ground water from the selected valley, a water appropriation permit must be acquired from the Utah State Engineer.

3.10.2 WATER AVAILABILITY AND QUALITY

The basins of west-central Utah are an abundant source of ground water (Henningson, et al., 1981b). Because the volume of water to be used for range facilities is comparatively small (see Section 4.10), rigorous discussion of water availability and quality in the region of influence (ROI) are not addressed in this Environmental Impact Statement (EIS). The following paragraphs contain brief

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descriptions of the use and quality of ground water from Tule, Snake, and Whirlwind valleys.

The quality of water resources in west-central Utah is extremely variable. Ground water from Tule Valley is generally of poor quality. Poor water quality has been reported for the western and southern parts of the valley, where high concentrations of sulfate, fluoride, chloride, nitrate, and calcium occur (Henningson et al., 1981b). Water quality deteriorates to the southeast, toward the discharge area (Henningson et al., 1981b). Water quality in other parts of the valley does not meet secondary drinking water standards. Water pumped to the surface in Tule Valley is used chiefly for stock watering.

Water quality in the northern part of the Whirlwind Valley meets secondary drinking water standards (Henningson et al., 1981b). Two analyses from other parts of Whirlwind Valley report concentrations of total dissolved solids (TDS) at >200 milligrams per liter (mg/l) and 1,960 mg/l. Spring discharge in Whirlwind Valley supplies water to Fish Springs National Wildlife Refuge. Ground water pumped to the surface is used chiefly for stock watering.

Most of the water in Snake Valley is of the calcium and/or magnesium bicarbonate type. As ground water moves north and east through Snake Valley, it loses its bicarbonate nature, becoming concentrated in sodium, potassium, chloride, and sulfate. Groundwater in Snake Valley is of good quality, although some areas are classified as poor quality because of high concentrations of calcium, magnesium, fluoride, and TDS. Water use for irrigation and stock-watering began in Snake Valley in 1903; estimated groundwater withdrawals for irrigation as of 1981 were 14,000 acre-feet/year. Total natural discharge from Snake Valley is estimated to be 105,000 acre-ft/yr (Henningson et al., 1981b).

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3.11 HEALTH AND SAFETY

Section 4.11 describes the expected impacts of the ECTC on public health and safety. Baseline conditions, normally described in Chapter 3, are not applicable to health and safety and are therefore not included in this EIS.

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Chapter 4

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

4.1 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

4.1.1 INTRODUCTION

This section summarizes the environmental consequences by discipline for the proposed action, various alternatives to the proposed action, and the no-action alternative. Cumulative impacts from ECTC construction and operation activities, in combination with other major projects that may affect the region, are also discussed. The effects that may result from decommissioning ECTC activities are summarized. The remainder of Chapter 4 provides more detailed discussion of each environmental resource area and techniques that could be used to mitigate impacts.

4.1.2 AIR QUALITY

Minor levels of hydrocarbon (HC) emissions will result from ECTC construction and operations. HC, a product of incomplete fuel combustion and a precursor to ozone, will exhibit the largest increase relative to existing emissions in Tooele County. The area around Hill Air Force Base (AFB) may be the most sensitive to the increase in HC, because the county in which the base is located is currently in violation of the ozone ambient air quality standard. The HC resulting from ECTC activities will contribute to the current non-attainment status of Tooele County. If the proposed action does not occur, the status of the county with respect to ozone ambient air quality is not likely to change in the near future.

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4.1.3 ECOLOGICAL RESOURCES

Radio-frequency emissions from some threat simulators will be hazardous to birds, owls, and bats, a few of which are likely to be killed over the life of the program. Human activities and aircraft noise will adversely affect some critical wildlife habitat and associated wildlife population. No threatened and endangered (T&E) plant species were identified during pre-activity inventories that would experience impact; however, it is possible that T&E species are located in the ECTC area. Under the Whirlwind Valley alternative, overflights that occur near Fish Springs National Wildlife Refuge will adversely affect a part of this major Pacific Flyway migratory bird refuge as a result of aircraft noise and potential bird strikes; some nesting habitat may be affected. Under the Snake Valley alternative, construction activity will adversely affect least chub habitat and waterfowl habitat. Ecological resources will remain as described in Chapter 3 if the ECTC is not implemented.

4.1.4 UNIQUE FEDERAL LANDS

Some Wilderness Study Areas (WSAs) may experience deterioration in wilderness characteristics as a result of noise generated by ECTC aircraft operating in low altitudes. Sections of the Pony Express Trail, which has been proposed as a National Historic Trail, will be adversely affected by low-flying aircraft. Minor impacts would occur at Great Basin National Park as a result of noise and visual intrusions from aircraft. Under the Whirlwind Valley alternative, Fish Springs National Wildlife Refuge may be adversely affected as a result of potential bird strikes and aircraft-generated noise-disruption over a part of the waterfowl habitat. If the ECTC is not implemented, unique Federal lands and sites will remain as they are described in Chapter 3.

4.1.5 CULTURAL RESOURCES

One prehistoric site was identified during pre-activity surveys of the initial TTA sites and access roads in the three valleys. The site did not qualify for the National Register of Historic Places. Wendover Airfield is listed on the National Register and may be adversely affected by construction activities at Wendover. American Indians representatives visited the valleys and most of the initial tactical threat area (TTA) sites and identified traditional cultural values that could be adversely affected by ECTC construction and operation activities. They expressed concern over the strategic threat area (STA) sites near Cedar Mountain, and the Frisco Peak and Tunnel Springs Mountain gapfiller radar sites. Both Snake and Whirlwind valleys are likely to contain more cultural resources and to have more traditional cultural values associated with them than Tule Valley. Cultural resources would be more adversely affected under these alternatives than under the proposed action. If the ECTC is not implemented, cultural resources will remain as they are described in Chapter 3.

4.1.6 AIR SPACE

A minor reduction in air-space accessibility to general aviation would occur as a result of the ECTC. Increase coordination of air-space activities will result from installation of the gapfiller radar.

4.1.7 NOISE

Noise impacts are primarily the result of aircraft operations in the proposed and alternative valleys. Impacts will include annoyance, startle effects, and possibly, minor damage to a portion of the very small number of dwellings or other structures located in the selected valley. Tule Valley has no residents; however,

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aircraft entry into the valley would result in low-altitude overflight of more populated areas than under the Whirlwind Valley alternative. As a result, more noise impacts would occur under the proposed action (Tule Valley) than under the Whirlwind Valley alternative. Conversely, more individuals live in Snake Valley and would be impacted by low-altitude overflights and aircraft noise than under the Tule Valley action. As a result, fewer noise impacts would occur under the proposed action (Tule Valley) than under the Snake Valley alternative. Within a valley, electrical generators used to power threat sites will cause very localized noise impacts around each site. The noise impact at primary staging bases is annoyance to local residents. No noise impacts would occur at Michael Army Airfield (AAF); slight noise impacts would occur at Hill AFB; and significant noise impacts would occur at Fillmore and Wendover.

4.1.8 LAND USE

Regardless of the valley chosen, selected roads will be closed approximately once a month during ECTC operations, causing inconvenience and annoyance to travellers. Under all alternatives, there will be some effect on grazing animals due to aircraft noise and minor loss of forage and some loss of wilderness characteristics due primarily to aircraft noise and visual intrusions, resulting in some reduction in the quality of recreation activities. Visual resources may be adversely affected in a minor way as a result of the contrast between ECTC structures and the local environment. Impacts on land use in the proposed valley (Tule) may be slightly greater than impacts in Snake Valley, and about the same as impacts in Whirlwind Valley.

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4.1.9 SOCIOECONOMICS

Depending upon the staging-base alternative chosen, by the year 2000, between 850 and 1,000 direct jobs will be created as a result of the ECTC. Also, between 1,250 and 1,700 individuals will be temporarily assigned to the region during the operations phase. In addition, between 1150 and 1700 secondary jobs will be created. Construction spending will total between $80 and $140 million; regional spending during operations will be approximately $44 million annually by year 2000. Depending on the primary staging base selected, some communities may experience minor impacts on services, facilities, and education. These impacts will be greater if Wendover or Fillmore is selected as the primary staging base than they would be under the proposed action (Hill AFB). Adverse changes in the lifestyle of residents living in or near the valleys could occur as a result of ECTC operations, such as temporary road closures and low-altitude aircraft overflights. Selection of Snake Valley will have significant effects in Baker, NV and Garrison, UT due to inmigration and a subsequent severe lack of community services. These impacts would be substantially less under the proposed Tule Valley action than they would be under the Snake or Whirlwind alternatives.

4.1.10 WATER RESOURCES

The amount of water required for ECTC purposes is small compared to the amount of water available in west-central Utah. The source for water would be municipal water systems for ECTC facilities located in towns or cities, and ground water for range purposes. If primary staging is sited in Wendover, minor impacts on the water distribution system will occur if the system is not updated for delivery to industrial users; necessary changes to the water delivery system are currently planned. When ground water or water that is not supplied by municipal systems is necessary, appropriate

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applications will be filed with the Utah State Engineer. Tule Valley is closed to additional appropriations of ground water; the Air Force would purchase or lease water from current users, as necessary. The State Engineer will evaluate the application for water use in accordance with state law, which prohibits impacts to other owners of water rights. No impacts will occur to water resources.

4.1.11 HEALTH AND SAFETY

TO BE PROVIDED

4.1.12 MITIGATION

Mitigation can reduce many of the adverse environmental consequences described in this chapter. In addition to the mitigation measures specified under each resource area addressed in the remainder of Chapter 4, the Air Force will operate in accordance with all permit requirements stipulated by the Bureau of Land Management (BLM), the State of Utah, and other Federal agencies, such as the Federal Aviation Administration and the Federal Communications Commission.

4.1.13 CUMULATIVE EFFECTS

To address cumulative effects, possible major projects and major projects under construction in the region were identified and plotted on a map (Figure 4.1-1). A determination of possible cumulative effects from these projects and the ECTC was made. Table 4.1-1 presents this process and the conclusions. The results of these investigations indicate that cumulative, adverse socioeconomic impacts may occur if Snake Valley is chosen or if Michael AAF becomes the primary staging base. Cumulative socioeconomic impacts are discussed in Section 4.2.9.

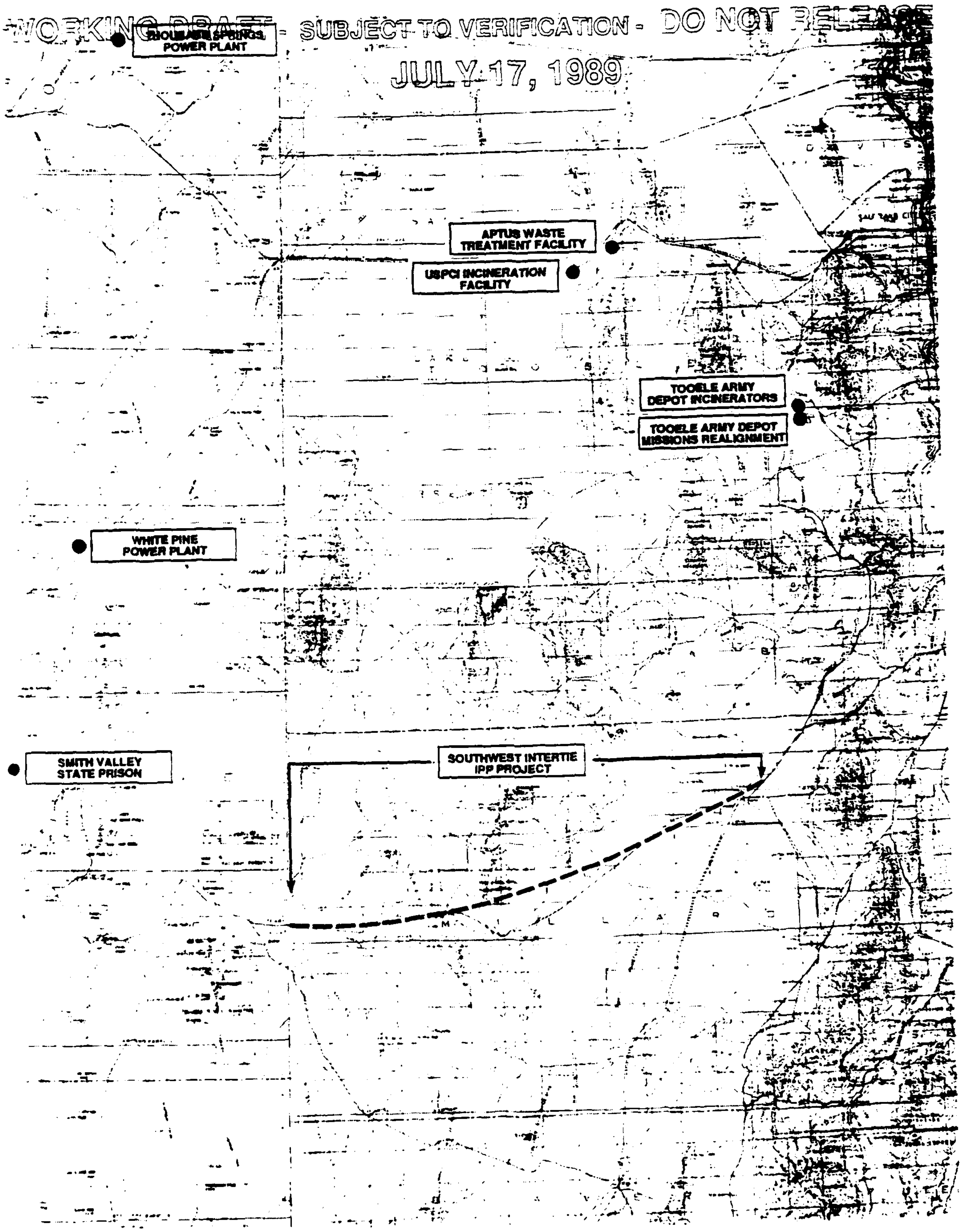

Figure 4.1-1. Location of other major projects in the region of influence.

Table 4.1-1. Cumulative environmental impact analysis process.

Project	Approximate location	Possible cumulative impacts
Thousand Springs Power Plant	Elko Co., NV, 30 Miles NE of Wells	None
White Pine Power Plant	On I-95, 10 Miles S of White Pine/ Elko Co. line in White Pine Co. (48 Miles N of Ely)	Socioeconomics, if Snake Valley is selected
Smith Valley State Prison	10 Miles NW of Ely, NV, in White Pine Co.	Socioeconomics, if Snake Valley is selected
Southwest Inter-tie Project (transmission line)	Elko and White Pine counties, NV, and Box Elder and Tooele counties, UT	None
Aptus Waste Treatment Facility	60 Miles W of Salt Lake City, Tooele County, UT	Socioeconomics, if Michael Airfield is primary staging base
USPI Incineration Facility	65 Miles W of Salt Lake City, Tooele County, UT	Socioeconomics, if Michael Airfield is primary staging base
Tooele Army Depot Incinerators	40 Miles SW of Salt Lake City, Tooele Co., UT (25 Miles E of Dugway)	Socioeconomics, if Michael Airfield is primary staging base
Transfer of Missions	Tooele Army Depot	Socioeconomics, if Michael Airfield is primary staging base

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4.1.14 DECOMMISSIONING

Decommissioning of major ECTC facilities is not anticipated. The ECTC is considered a capability, as opposed to a project with a definitive time frame. It is possible that facilities will be altered over time. If such activity occurs, the Air Force will prepare appropriate environmental reports in accordance with the Council on Environmental Quality (CEQ) regulations under the National Environmental Policy Act (NEPA).

Decommissioning of individual threat sites could occur. If so, this activity would be sporadic, of short duration, and will conform to all requirements stipulated by the BLM. Consequently, there are no anticipated significant impacts associated with any decommissioning activity.

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4.2 AIR QUALITY

Air quality is concerned with air emissions of pollutants generated by project activities and the resultant impact of those emissions on ambient air quality. Both the incremental and absolute air quality changes are of importance.

For this analysis, air emissions were calculated for fugitive dust (dust generated by construction activities and travel over gravel roads), vehicular travel, aircraft engines, and ancillary equipment. These emissions were then compared to existing county emissions to determine the magnitude of the increase. Comparison to existing emission is a conservative approach, since non-ECTC emissions will probably increase over time, making the ECTC increment that much smaller.

The significance of the emission increase is determined, based upon several factors including: existing air quality, location of the increase compared to major air pollution sources in the county, and the ability to translate small emissions increases into changes in air quality. With regards to this last point, most of the air emissions associated with ECTC come from a large number of small emitters such as vehicles and aircraft. This causes dispersion of the emissions over a wide area. Such dispersion reduces the potential for the incremental emissions to affect air quality.

4.2.1 PROPOSED ACTION

4.2.1.1 <u>Construction</u>

Construction emissions will be short-term and temporary, and will consist primarily of fugitive dust. Other emissions associated with construction vehicles will have much less impact than fugitive dust, defined as particulate matter that becomes airborne due to

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natural causes and human activities. Fugitive dust emissions will be generated from road building and areas cleared for construction, and from related motor vehicle and heavy-duty construction equipment.

Fugitive dust emissions from construction activities are proportional to the area of land being worked and to the level of construction activity. Approximately 1.2 tons of fugitive dust is emitted per acre of construction for each month of construction activity (EPA, 1985). Using this emission factor, fugitive dust emissions have been estimated for the peak year of construction activity at Tule Valley (including the Sand Pass range maintenance facility [RMF]), the Wendover RMF, Hill Air Force Base (AFB), and Michael Army Airfield (AAF). These peak-year estimates include fugitive dust generated from the construction of buildings, pavements, additional access roads, and threat sites.

Tule Valley

During the peak year for road construction (1992) 334 acres of land will be disturbed. Without dust control measures, total fugitive dust emissions generated in 1992 would be approximately 480 tons. Without mitigation, fugitive dust emissions from road construction are transient and result in less than one percent increase over the combined Juab and Millard counties, 1985 emissions inventory of 63,000 tons per year (State of Utah, 1985). Both Juab and Millard counties are in attainment for particulate matter, and the ECTC project will not affect this status.

Wendover maintenance facility

The total facility construction area for the peak construction year (1995) is approximately 7.6 acres. The total fugitive dust emitted from the construction of these facilities will be approximately

10.9 tons which is a negligible increase over 42,238 tons per year fugitive dust emissions shown in the 1985 Tooele County emissions inventory (State of Utah, 1985). In addition, Wendover is in a remote area at the western border of Tooele County, just east of Elko County, Nevada. Both counties are in attainment for particulate matter and the ECTC project will not affect this status.

Hill AFB

At Hill AFB, the total facility construction area for the peak construction year (1995) is approximately 37 acres. The total fugitive dust emitted from construction will be approximately 52.4 tons, which is a negligible increase over the 29,361 tons/year fugitive dust emissions in Davis County in 1985 (State of Utah, 1985), the 52.4 tons/year increase in fugitive dust emissions at Hill AFB is not significant. Davis County is an attainment area for particulate matter, and the ECTC project will not affect this status.

Michael AAF

At Michael AAF, the total facility construction area for the peak construction year (1997) is approximately 38.7 acres. The total fugitive dust emitted from construction will be approximately 28.8 tons which is a neglible increase over the 42,238 tons/year fugitive dust emissions in Tooele County in 1985 (State of Utah, 1985). Tooele County is an attainment for particulate matter and its status will not change due to these activities.

4.2.1.2 Operations

During operations, emissions will be generated from aircraft, commuters, and ancillary activities. At staging bases, aircraft

emissions have been quantified for the number of projected landing and take-off (LTO) cycles in the peak operating year 2000. Over the range, year 2000 aircraft emissions have been quantified for the number of hours that aircraft are estimated to be at or under elevations that impact ground-level air quality. Automobile emissions from the commuting work force have been calculated for each work location relative to the anticipated origin of workers commuting to and from each ECTC facility. Ancillary activities at staging bases include space heating, emergency electric generation, base motor vehicles, incineration and evaporative emissions from fuel storage/transfer, aircraft fuel purging, fuel spills, degreasing, and surface coating. Emissions estimates for ECTC ancillary activities have been made using the ratio of LTOs to Hill AFB ancillary activity emissions, as reported in the 1987 Hill AFB emission inventory (U.S. Air Force, 1988).

Tule Valley

Aircraft emissions

Airborne aircraft emissions are normally dispersed over large areas; the resulting pollutant concentrations are reduced as a function of wind speed, atmospheric stability, and time. However, to estimate the impact of aircraft operations over the range, a scenario has been developed wherein emissions are assumed to be contained entirely within a "low-level box" having dimensions that encompass all low-level patterns, including tactical threat area (TTA) and strategic threat area (STA) engagement. The box does not include landings, take-offs, and returns to base. The height of the box is given at the average afternoon mixing height of 7,662 ft above ground level (AGL) (EPA, 1972). Thus, a box measuring 147 miles long, 30 miles wide, and 7,662 ft deep has been constructed for this assessment.

For this assessment, aircraft emission factors (U.S. Air Force, 1985) have been applied to the distribution of aircraft types for the estimated 8,127 aircraft operations in the year 2000. With the exception of high-altitude aircraft operating in off-range orbits, refueling sorties, and Airborne Warning and Control System (AWACS), it has been assumed that all aircraft will operate within the "box" for an average of one hour per mission using the military throttle setting. The total annual emissions generated by each aircraft have been computed by multiplying each aircraft's total number of annual operations in the box by the corresponding military throttle emission factor for each pollutant.

The resulting tons per year and tons per day estimates for each pollutant emitted over the range from ECTC aircraft operations in the year 2000, assuming a 272 day/year operating schedule, is shown in Table 4.2-1. To calculate the resulting air quality impact for the box in units of micrograms per cubic meter ($\mu g/m^3$), the tons per day value is converted to kilograms per day, divided by the box volume of 2.45×10^{13} cubic meters, and corrected to standard temperature and pressure.

As shown in Table 4.2-1, the maximum incremental increase to air quality for any pollutant is 0.274 $\mu g/m^3$ for NO_2. This increase is negligible compared to the annual mean National Ambient Air Quality Standards (NAAQS) of 100 $\mu g/m^3$ for NO_2. The three counties involved (Millard, Juab, and Tooele) are in attainment for NO_2, and this status will not change as a result of the ECTC.

The only non-attainment pollutant is SO_2 in Tooele County, at elevations greater than 5600 mean sea level (MSL). As shown in Table 4.2-1, the incremental impact to air quality for SO_2 is estimated to be 0.012 $\mu g/m^3$, which is a negligible contribution to the 24-hour primary NAAQS of 365 $\mu g/m^3$ for that pollutant.

Table 4.2-1. Emissions and air quality impacts from aircraft operations over the range in 2000.

POLLUTANT	TONS/YEAR	TONS/DAY	AQ INCREMENT $\mu gm/m_3$
CO	172.6	0.63	0.034
HC	12.9	0.047	0.002
NO_2	1402.1	5.160	0.274
PM	27.4	0.101	0.005
SO_2	62.4	0.229	0.012

Vehicular emissions and dust

Range maintenance facility personnel will drive their personal cars to the RMF in most cases. Using the distribution of these personnel as described in Section 4.9, and assuming 1.2 persons per vehicle from rural locations and 1.5 persons per vehicle from small and large towns, an estimate of 6,800,000 commuter vehicle miles traveled (VMT) is projected for the year 2000.

There would be travel from the Tule RMF, Wendover RMF, and Michael AAF to the threat sites each day, resulting in an additional 2,600,000 VMT in the valley each year. Pollutants generated from this mobile source activity have been calculated from emission factors derived from AP-42 (EPA, 1985). The specific emissions factors used assume a high altitude, year 2000 light duty vehicle (LDV) modal mix scenario, and all vehicles cold-started. Listed

below are the yearly emissions projected from the Tule Valley commuter vehicle fleet:

CO	800	tons/year
HC	100	" "
NO_x	36	" "
PM	6	" "
SO_x	1	" "

Fugitive dust will also be produced by this increased traffic and wind. Based on the disturbance of the gravel roads by travel between the RMF and threat sites, approximately 2,300 tons of fugitive dust are expected each year.

Comparing the vehicle emissions to the three county (Tooele, Juab and Millard) emission invent~~ies (State of Utah, 1985) indicates that the auto emissions will not degrade air quality, since they will be only approximately one percent of existing emissions. The 2,300 tons per year of fugitive dust is a two percent increase in the county totals. This is not considered a significant increase. Results are similar for the alternative valleys.

Wendover maintenance facility

An estimated 120 personnel will be commuting daily to the Wendover RMF in the year 2000. Assuming an average of 1.2 persons per vehicle from Wendover and West Wendover, and 1.5 persons per vehicle from other locations, an estimated 881,747 commuter VMT is projected.

Pollutants generated from this mobile source activity have been calculated as described previously for the year 2000 LDV fleet.

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Listed below are the yearly emissions projected from the Wendover RMF commuter vehicle fleet:

CO	62.8	Tons/year
HC	6.7	" "
NO_x	2.9	" "
PM	0.42	" "
SO_x	0.13	" "

This commuter fleet will not have a significant impact on air quality. Fugitive dust estimates were not calculated since all roads likely to be used are paved.

Staging bases

Aircraft emissions

Aircraft emissions from staging areas have been computed for LTO cycles (Table 4.2-2). Each LTO is comprised of idle at start-up, taxi, engine check, runway roll, climb out, approach, landing, taxi, and idle at shut-down. Aircraft emission factors obtained from the Air Force for each aircraft (U.S. Air Force, 1985) have been used to calculate LTO emissions for the distribution of aircraft types for an estimated 5,860 aircraft operations at Hill AFB and 281 operations at Michael AAF in the year 2000.

Table 4.2-2. Aircraft emissions (tons/year) from Hill AFB (HAFB) and Michael AAF (MAAF) staging bases in 2000.

BASE	OPERATIONS	CO	HC	NO_x	PM	SO_x
HAFB	5860	258.5	122.9	45.7	2.15	10.4
MAAF	281	12.3	5.8	2.2	0.10	0.50

Vehicular emissions

Pollutants generated from personnel travel activity have been calculated as described above for the year 2000 LDV fleet. Listed in Table 4.2-3 are the yearly emissions projected for the Hill AFB and Michael AAF commuter vehicle fleets:

Table 4.2-3. Commuter vehicle emissions (tons/year) from Hill AFB (HAFB) primary staging bases in 2000.

BASE	VMT	CO	HC	NO_x	PM	SO_x
HAFB	5,361,393	381.6	40.8	17.5	2.5	0.77
MAAF	815,184	58.0	6.2	2.7	0.39	0.12

Ancillary emissions

According to the 1987 Hill AFB emission inventory (U.S. Air Force, 1988), the following amounts of emissions were generated from Hill AFB ancillary activities:

PM	5.60	tons/year	
SO_x	1.57	"	"
NO_x	117.	"	"
HC	359.6	"	"
CO	525.5	"	"

These emissions are associated with base operations and maintenance activities ancillary to a total of 33,500 LTO aircraft operations in the year 1987. A proportionate amount of ancillary emissions from 5860 ECTC-related LTOs at Hill AFB and 281 LTOs at Michael AAF in 2000 were estimated and are shown in Table 4.2-4.

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Table 4.2-4. Ancillary emissions (tons/year) from Hill AFB (HAFB) and Michael AAF (MAAF) staging bases in 2000.

	CO	HC	NO_x	PM	SO_x
HAFB	91.9	62.9	20.5	1.00	0.29
MAAF	4.4	3.0	0.98	0.05	0.01

No pollutants exceeding 100 tons per year will be emitted from ECTC ancillary activities. No single stationary source related to the ECTC can be classified as a major source requiring emission reductions, because the Hill AFB area is in a non-attainment area for CO and ozone.

Summing emissions from these three sources and comparing them to county totals suggests a minimal increment in emissions. The hydrocarbon (HC) increment in Davis county (from ECTC activities at Hill AFB) is approximately 2.4 percent of the current total county emissions. However, since HC is a precursor to ozone, for which the county is in a non-attainment status, this increment may exacerbate existing problems. All other increments are less than two percent and do not present any significant impacts.

4.2.2 ALTERNATIVE VALLEYS

Emission calculations for both construction and operation activities in Snake and Whirlwind valleys produce results similar to the proposed action. There are no impacts in either valley.

4.2.3 ALTERNATIVE PRIMARY STAGING BASES

4.2.3.1 Construction

Fugitive dust due to construction is insignificant and short-term under all staging alternatives. The incremental emissions are approximately one-quarter to one-third of one percent of current county emissions, except under the Salt Lake International Airport (SLC) alternative, where the increment is less than one-tenth of one percent.

4.2.3.2 Operations

Operational emissions for the alternative staging bases have been estimated for flight operations, personnel vehicle use, and on-base ancillary activities as described for the proposed action. All assumptions, unless otherwise noted, are the same as those used for the proposed action. Comparisons to county total emissions are only made for the primary staging bases in each alternative. In this way, only the largest impacts are noted for each staging area.

Michael Army Airfield

Estimated aircraft emissions from the staging of 3,634 aircraft operations at Michael AAF are shown in Table 4.2-5.

An estimated 409 ECTC personnel will commute daily to Michael AAF in the year 2000. Estimates of pollutants generated from this mobile source activity are shown in Table 4.2-6.

Emissions from ancillary activity related to aircraft operations have been estimated and are shown in Table 4.2-7.

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Table 4.2-5. Aircraft emissions (tons/year) from Michael AAF (MAAF) and Hill AFB (HAFB) staging bases in 2000.

BASE	OPERATIONS	CO	HC	NO_x	PM	SO_x
MAAF	3634	158.8	74.7	28.4	1.3	6.5
HAFB	2507	111.9	54.0	19.5	0.95	4.4

Table 4.2-6. Commuter vehicle emissions (tons/year) from Michael AAF (MAAF) and Hill AFB (HAFB) staging bases in 2000.

BASE	VMT	CO	HC	NO_x	PM	SO_x
MAAF	3,704,558	58.0	6.2	2.7	0.39	0.12
HAFB	4,077,257	290.2	31.0	13.3	1.9	0.59

[1] Assumes 1.2 persons per vehicle

Table 4.2-7. Ancillary emissions (tons/year) from Michael AAF (MAAF) and Hill AFB (HAFB) staging bases in 2000.

BASE	CO	HC	NO_x	PM	SO_x
MAAF	57.0	39.0	12.7	0.62	0.18
HAFB	39.3	26.9	8.8	0.43	0.13

Summing all emission sources and comparing them to the Tooele county emission inventory (State of Utah, 1985) indicates that

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hydrocarbons (HCs), precursors to ozone, would increase at approximately three percent of the county total. All other pollutants are below approximately one and one quarter percent. Tooele is not in violation of the ambient air quality standard for ozone, and no significant air quality problems are anticipated.

Salt Lake City International Airport

The aircraft staging emissions shown in Table 4.2-8 reflect all year 2000 aircraft LTOs projected at SLC, Hill AFB, and Michael AAF under this alternative.

An estimated 362 ECTC personnel will commute daily to SLC in the year 2000, 816 to Hill AFB, and 90 to Michael AAF. Estimates of VMT and pollutants generated from this mobile source activity in the year 2000 are shown in Table 4.2-9.

Emissions from ancillary activity related to aircraft operations have been estimated and are shown in Table 4.2-10.

Table 4.2-8. Aircraft emissions (tons/year) from Salt Lake City International (SLC), Hill AFB (HAFB), and Michael AAF (MAAF) staging bases in 2000.

BASE	OPERATIONS	CO	HC	NO_x	PM	SO_x
SLC	3353	146.6	68.9	26.2	1.2	6.0
HAFB	2507	111.9	54.0	19.5	0.95	4.4
MAAF	281	12.3	5.8	2.2	0.10	0.50

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Table 4.2-9. Commuter vehicle emissions (tons/year) from Salt Lake City International (SLC), Hill AFB (HAFB), and Michael AAF (MAAF) staging in 2000.

BASE	VMT[1]	CO	HC	NO_x	PM	SO_x
SLC	1,802,876	128.3	13.7	5.9	0.85	0.26
HAFB	4,077,257	290.2	31.0	13.3	1.9	0.59
MAAF	815,184	58.0	6.2	2.7	0.39	0.12

[1] Assumes 1.2 persons per vehicle

Table 4.2-10. Ancillary emissions (tons/year) from SLC, HAFB, and MAAF staging bases in 2000.

BASE	CO	HC	NO_x	PM	SO_x
SLC	52.6	36.0	11.3	0.57	0.17
HAFB	39.3	26.9	8.8	0.43	0.13
MAAF	4.4	3.0	0.98	0.05	0.01

Total increases in emissions in the Salt Lake area for these activities are extremely small and insignificant compared to county totals. The greatest increase is in HC which equals approximately one third of one percent of existing county emissions (State of Utah, 1985). Although Salt Lake County is in violation of the ozone standard no exacerbation of the problem is anticipated due to the small increase in HC emissions. Consequently, no impacts are predicted.

Wendover Airfield

The aircraft staging emissions shown in Table 4.2-11 reflect all year 2000 aircraft LTOs projected at Wendover Airfield, Hill AFB, and Michael AAF under this alternative.

An estimated 417 ECTC personnel (RMF employees not included) will commute daily to Wendover Airfield in the year 2000, and 906 to Hill AFB and MAAF. Wendover Airfield commutes will originate from areas surrounding the airfield as described for the RMF under the proposed action. Estimates of VMT and pollutants generated from this mobile source activity in year 2000 are shown in Table 4.2-12. Emissions from ancillary activity related to aircraft operations are shown in Table 4.2-13.

Table 4.2-11. Aircraft emissions (tons/year) from Wendover Airfield (WAF), Hill AFB (HAFB), and Michael AAF (MAAF) staging bases in 2000.

BASE	OPERATIONS	CO	HC	NO_x	PM	SO_x
WAF	3353	146.6	68.9	26.2	1.2	6.0
HAFB	2507	111.9	54.0	19.5	0.95	4.4
MAAF	281	12.3	5.8	2.2	0.10	0.50

Table 4.2-12. Commuter vehicle emissions (tons/year) from Wendover Airfield (WA), Hill AFB (HAFB), and Michael AAF (MAAF) staging bases in 2000.

BASE	VMT[1]	CO	HC	NO_x	PM	SO_x
WAF	3,089,820	219.9	23.5	10.1	1.5	0.44
HAFB	4,077,257	290.2	31.0	13.3	1.9	0.59
.AAF	815,184	58.0	6.2	2.7	0.39	0.12

[1] Assumes 1.2 persons per vehicle

Table 4.2-13. Ancillary emissions (tons/year) from Wendover Airfield (WA), Hill AFB (HAFB) and Michael AAF (MAAF) staging bases in 2000.

BASE	CO	HC	NO_x	PM	SO_x
WAF	52.6	36.0	11.3	0.57	0.17
HAFB	39.3	26.9	8.8	0.43	0.13
MAAF	4.4	3.0	0.98	0.05	0.01

Adding all emissions sources indicates that the largest increase to existing county emissions will be for HC. The increase is approximately three and one-half percent of Tooele County level in 1985 (State of Utah, 1985). Tooele County is in attainment for ozone, consequently no significant impacts are anticipated.

Delta and Fillmore airfields

The aircraft staging emissions shown in Table 4.2-14 reflect all year 2000 aircraft LTOs projected at Delta Airfield, Hill AFB, and Michael AAF under this alternative. All estimates are assumed to reflect the Fillmore Airfield alternative since Fillmore and Delta are in the same county (Millard).

Table 4.2-14. Aircraft emissions (tons/year) from Delta Airfield (DA), Hill AFB (HAFB), and Michael AAF (MAAF) staging bases in 2000.

BASE	OPERATIONS	CO	HC	NO_x	PM	SO_x
DA	3353	146.6	68.9	26.2	1.2	6.0
HAFB	2507	111.9	54.0	19.5	0.95	4.4
MAAF	281	12.3	5.8	2.2	0.10	0.50

An estimated 417 personnel will commute daily to Delta Airfield in the year 2000 and 906 will commute to Hill AFB and Michael AAF.

Estimates of VMT and pollutants generated from this mobile source activity in year 2000 are shown in Table 4.2-15.

Emissions from ancillary activity related to aircraft operations are shown in Table 4.2-16.

Table 4.2-15. Commuter vehicle emissions (tons/year) from Wendover Airfield primary staging in 2000.

BASE	VMT[1]	CO	HC	NO_x	PM	SO_x
DA	3,010,044	214.2	22.9	9.8	1.4	0.44
HAFB	4,077,257	290.2	31.0	13.3	1.9	0.59
MAAF	815,184	58.0	6.2	2.7	0.39	0.17

[1] Assumes 1.2 persons per vehicle from northeast Millard County and 1.5 ppv from other locations

Table 4.2-16. Ancillary emissions (tons/year) from Delta Airfield (DA), Hill AFB (HAFB), and Michael AAF (MAAF) staging bases in 2000.

BASE	CO	HC	NO_x	PM	SO_x
DA	52.6	36.0	11.3	0.57	0.17
HAFB	39.3	26.9	8.8	0.43	0.13
MAA	4.4	3.0	0.98	0.05	0.01

Comparing the Delta totals to the Millard County totals (Utah, 1985) indicates a large increase in HC (approximately 5.6 percent) will occur under this alternative; however, the county is in

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attainment currently and its status is not anticipated to change under this alternative. Increases in CO and No_x are approximately two and one third percent each. There are currently no air quality ambient air violations in the county, and none are anticipated to result from the ECTC under these alternatives.

Fillmore Airfield is also located in Millard County. Emission estimates and comparison to county totals yield the same results.

4.2.4 MITIGATION

No mitigation is required, based upon the impact assessment presented in the previous sections.

4.2.5 UNAVOIDABLE IMPACTS

ECTC operations at any proposed or alternative location will produce criteria pollutant emissions. Increases in HC will occur at all primary staging base alternatives. The resulting increase, however, is not anticipated to change the attainment/non-attainment status of any county in the region of influence. There are no significant unavoidable impacts.

4.3 ECOLOGICAL RESOURCES

The following types of impacts may affect ecological resources within the project area: (1) direct and indirect impacts of construction of threat sites and their associated facilities; (2) indirect impacts of operation of the threat sites and their associated facilities; (3) direct and indirect impacts of aircraft overflights; and (4) direct impacts associated with bird-aircraft strike hazards. The following sections discuss the potential for these impacts for the proposed action, alternative valleys, and alternative staging bases. Procedures or mitigations that may be adopted to reduce significant impacts are identified, and the cumulative impacts of the project are also presented.

Impacts to ecological resources were evaluated by comparing ecological resource maps to maps portraying the construction and operational aspects of the proposed action and each alternative, and by analyzing the sensitivities of the resources to each proposed activity or project feature that could cause disturbance. The resource overlays were developed from data provided by the Utah Department of Wildlife, a U.S. Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), and field surveys conducted for this project. Reconnaissance field surveys were conducted to identify the ecological resources occurring in the project area and to confirm the accuracy of resource mapping.

Detailed field surveys were conducted to identify sensitive plants and animals occurring in the vicinity of areas proposed to be disturbed during Phase I construction. These surveys are described in detail in the biological assessment, a study that is being conducted in accordance with Section 7 of the Endangered Species Act. All Phase I disturbance areas in Tule, Snake, and Whirlwind Valleys were surveyed during the late spring and summer of 1989 to determine the presence of threatened, endangered, and candidate

species, unique and sensitive areas, and wildlife species that could be affected by the proposed action and alternatives. In some instances, project features have been relocated to avoid or reduce the impact to sensitive areas and species. Additional surveys and Formal Section 7 consultation, if required by the USFWS, will be conducted prior to initiation of any construction activities in areas that were not surveyed in the summer of 1989.

Determination of the significance of impacts was based on: the importance (legal, commercial, recreational, ecological, or scientific) of the resource; the proportion of the resource that would be affected relative to its occurrence in the region; the sensitivity of the resource to construction, operation, or overflight activities; and the duration or the ecological ramifications of the effect.

4.3.1 *IMPACTS OF THE PROPOSED ACTION (TULE VALLEY)*

The ECTC arena includes levels of defense zones grouped into tactical threat areas (TTA), intermediate threat areas (ITA), and strategic threat areas (STA). The STA and ITA areas are located near Wildcat Mountain and Goodyear Road in the Great Salt Lake Desert on the Dugway Proving Ground. These ITA and STA areas would be common to all alternative configurations. STA 2 and ITA 6 lie on Department of Defense (DOD) land. STA 9 is on BLM land. Construction of the ITA (6), which would include widening roads, creating new access roads, and developing threat sites, would disturb approximately 42 acres of dry lake bed and salt desert shrub vegetation. Construction of the STA (Areas 2 and 9), which would include widening roads, creating new access roads, and developing threat sites, would disturb approximately 171 acres of dry lake bed, salt desert shrub, and lower bajada (sagebrush) vegetation. Thus a total of approximately 213 acres of land and/or vegetation would be disturbed during construction of the ITA and

STA. Because much of this area is very sparsely vegetated, this disturbance and loss of vegetation would not be significant.

4.3.1.1 Impacts of TTA construction in Tule Valley

Included in this discussion of TTA construction are effects caused by (1) constructing the TTA sites; (2) upgrading or constructing new roads; (3) installing the proposed fiber-optics network along the proposed roads; and (4) installing the electrical transmission lines.

The proposed layout for the TTA in Tule Valley and its relationship to ecologically sensitive areas (as defined in Chapter 3) is shown in Figures 4.3-1 a, b, c, and d. The proposed TTA is located in the north end of the valley, between the Confusion Range and the fish Springs and House Ranges. Construction of the TTA would occur primarily in the lowest elevations of the valley and extend into lower bajadas. Construction would result in a loss of about 760 acres of desert scrub vegetation, most of which lies adjacent to existing roads. Installation of the fiber-optics network and the power lines that connect the existing Trout Creek gapfiller radar site to the proposed fiber-optic network will disturb approximately 12 acres of juniper-Great Basin sagebrush vegetation.

Power for the RMF and the TTA sites will be provided by a new above-ground transmission line to be constructed on the east side of Tule Valley as an extension of an existing line that follows existing roads (see Chapter 2). Three-phase cross-arm construction poles about 35 feet tall will be used. Construction of these lines would cause minimal disturbance to Great Basin sagebrush and transitional juniper vegetation. The power transmission lines will

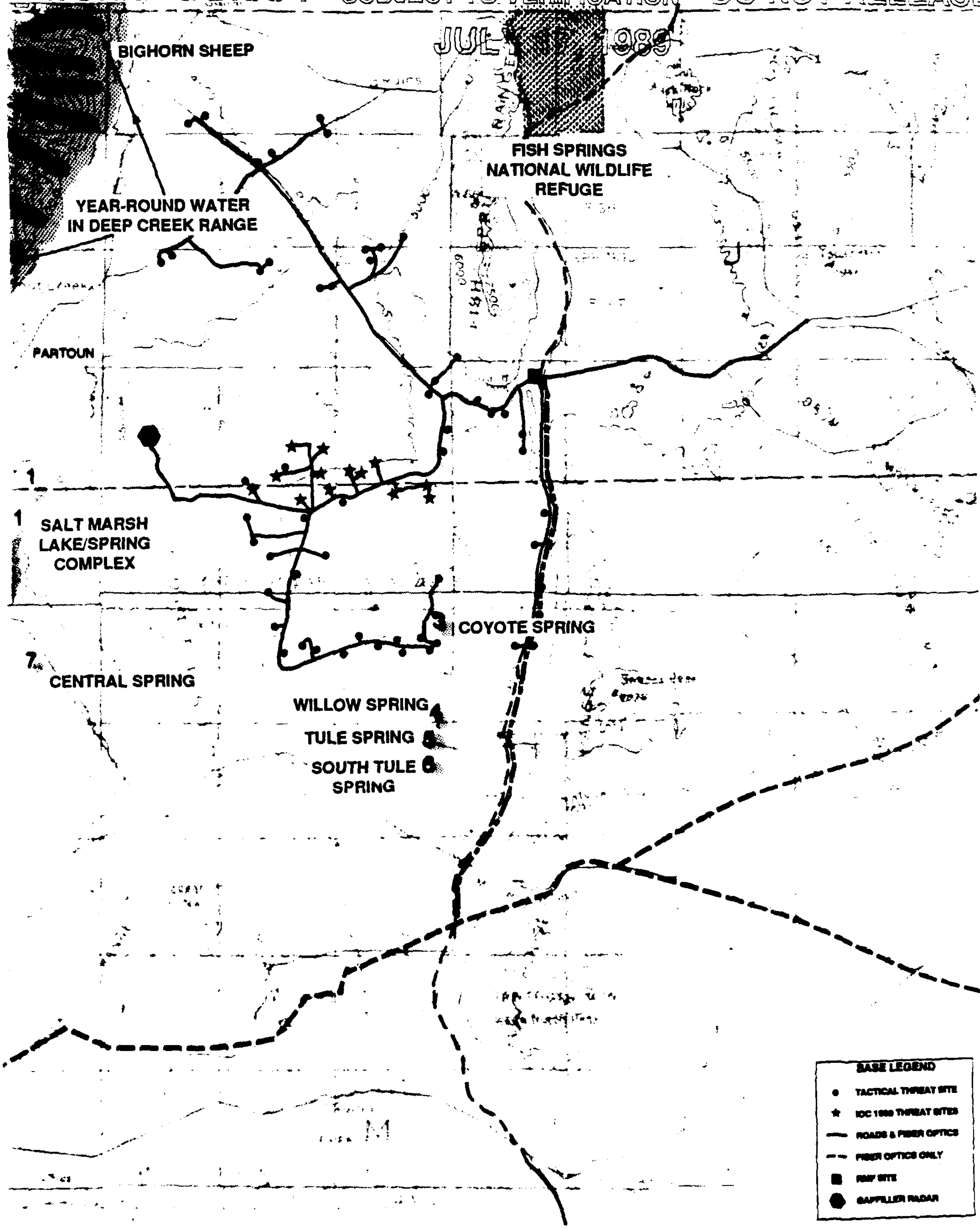

Figure 4.3-1a. Construction locations and sensitive aquatic and bighorn sheep habitats in Tule Valley.

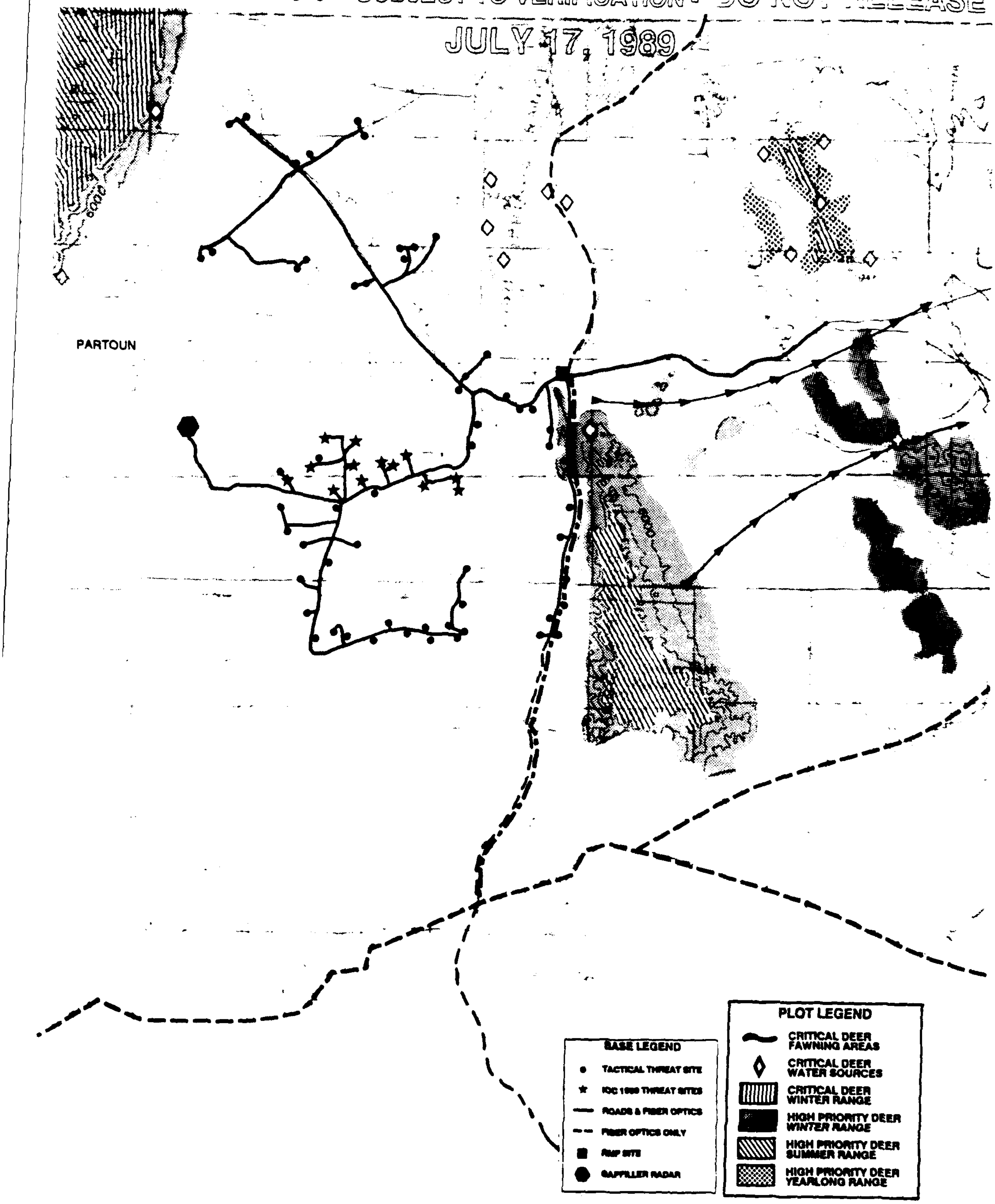

Figure 4.3-1b. Construction locations and critical muledeer habitat in Tule Valley.

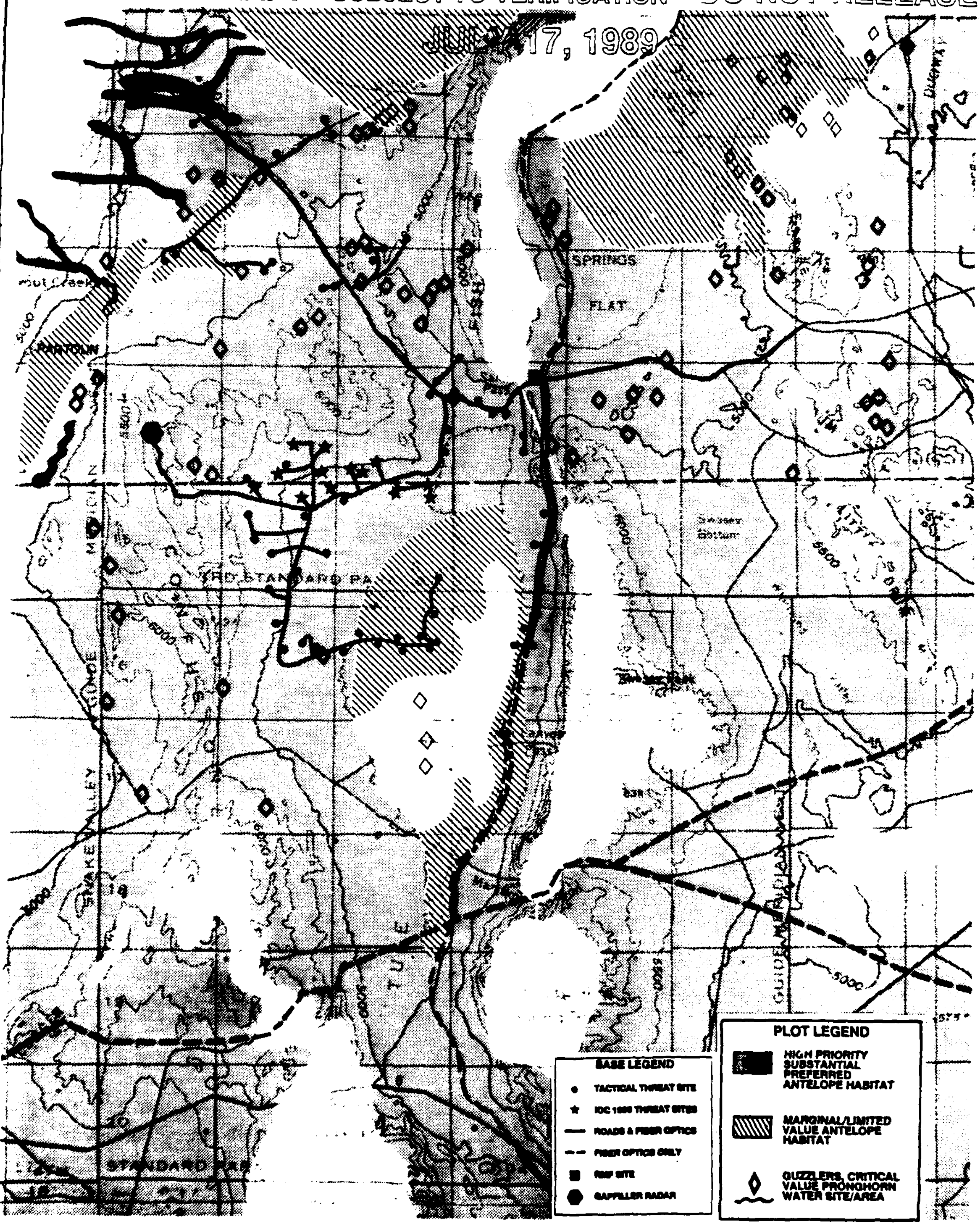

Figure 4.3-1c. Construction locations and critical antelope habitat in Tule Valley.

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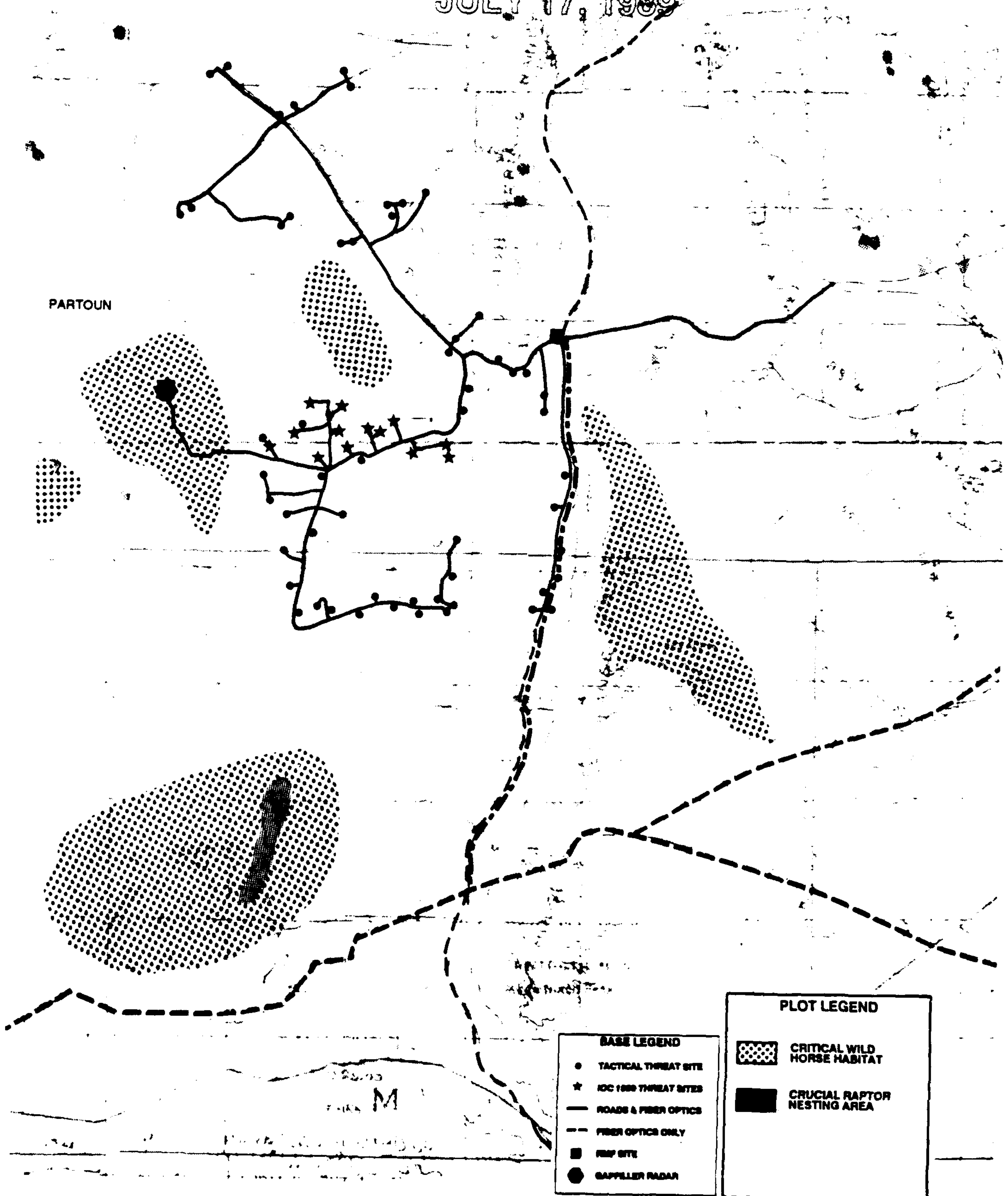

Figure 4.3-1d. Construction locations and critical wild horse and raptor habitat in Tule Valley.

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be designed to prevent the electrocution of birds; however, there would be a slight potential for bird collisions. In this area, raptors follow mountain ranges during their migration. Most of them, however, migrate at elevations higher than the proposed power transmission lines, and they are not likely to be affected. Raptors are known to use power poles as perches in the absence of suitable trees and snags.

Construction of some of the TTA sites in Tule Valley will occur in UDWR-designated High Priority Value Pronghorn habitat and Limited Value Pronghorn habitat. Pronghorn antelope are present throughout this area, and they may temporarily abandon areas where concentrated construction activities are occurring. This short-term impact would not be significant, but it could become significant if operations and maintenance activities prevented the eventual return of the animals to that area. There are also a few critically-valued watering areas and sites in the proposed construction area (BLM resource maps, undated). The Middle Range has been identified by the BLM as a critical wild horse area. The road (Weiss Highway) leading to site clusters 5 and 8 passes within one mile of this range. Because wild horses are common and wide-ranging species, impacts of construction activities would not be significant.

Construction of TTA sites as proposed will not directly affect any aquatic habitats or protected species. Sites 3C and 4G are located near Coyote Springs, which provides habitat for the least chub, and fish that is a candidate for Federal listing as an endangered species. The proposed TTA sites are 0.5 miles from the spring, which is the BLM-recommended stand-off or avoidance distance (M. Pierce, 1989). Therefore, there would be little or no impact to the least chub.

There have been isolated sightings of bald eagles and peregrine falcons, both of which are Federally protected as endangered, and western snowy plovers, which are candidates for Federal listing as endangered, in Tule Valley. These species could be indirectly affected by construction of the TTA in Tule Valley, but it is not likely. Surveys conducted for the 13 FY 1990 construction sites and associated road alignments, fiber optic routes, and road improvement areas being addressed in the biological assessment showed no evidence of nesting habitat within the immediate vicinity of these areas. Bald eagles and peregrine falcon may use the area for hunting and could be temporarily disturbed by construction activities. Western snowy plover habitat was not identified in the construction surveys.

4.3.1.2 <u>Impacts of construction of Tule Valley facilities</u>

Range Maintenance Facilities (RMF). Two RMFs will be constructed as part of the proposed action, one near Sand Pass on the northeast side of the valley, the other at Wendover, on the border of Utah and Nevada. Construction of the Sand Pass RMF would disturb approximately 160 acres of Great Basin sagebrush vegetation that is grazed both by wildlife and livestock. Although the loss of this vegetation would constitute a long-term impact, this impact would not be significant because of the widespread distribution of this vegetation in this region. Construction activities would also permanently displace small animals that reside in or utilize the area of disturbance. These impacts would not be significant. Big-game animals such as muledeer and pronghorn would temporarily abandon the area during construction. This would be a short-term, insignificant impact. No protected species would be affected by construction of the RMF at Sand Pass.

Impacts of construction of the RMF at Wendover would be similar to those described above. The Wendover AA would be expanded to

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accommodate the proposed buildings and work areas. Little undisturbed native vegetation remains in the proposed construction area, therefore impacts would not be significant. No protected species would be affected by construction.

Gapfiller Radar Facility

A gapfiller radar facility is proposed to be constructed on Frisco Peak, which is located in the San Francisco Mountains about 50 miles south of the proposed TTA. Existing roads and power lines would be used to supply access and power. The road to Frisco Peak would require improvement, and a cleared pad would be necessary for the radar system. These activities would result in the disturbance or loss of approximately 100 acres of juniper and sagebrush vegetation. This would be an insignificant impact. No species that are Federally listed as endangered or threatened would be affected by construction of this facility. Three candidate plant species (Eriogonum soredium, Lepidium ostleri, and Trifolium andersonii var. friscanum) occur at mid to upper elevations in the Frisco Peak/Grampian Hill area; these species could be affected by road improvements in the area. Site-specific field surveys will be conducted in this area to avoid the potential for significant impacts.

Mission Control Center (MCC)

A new MCC consisting of buildings, attendant access roads, and parking areas, is proposed to be constructed at Hill AFB. The proposed site is situated on a vacant parcel of land on the east side of the existing airfield. Construction will disturb approximately 40 acres of tame grassland. This would be an insignificant impact. Construction of the MCC would have no effects on wildlife or protected species. This facility will be linked via the fiber-optics system to the RMFs and the gapfiller

radar sites. Two alternative fiber-optic routes linking the RMF with the MCC have been proposed. Alternative I follows an existing railroad right-of-way from the MCC at Hill Air Force Base (AFB) to the intersection at Interstate 80. From the intersection at Interstate 80 the fiber optics would be placed along an existing road and terminate at the Tule Valley RMF at Sand Pass which is also the common fiber optic link for all valleys. Approximately 70 acres of desert scrub would be disturbed. The alignment would cross approximately four miles of the Fish Spring National Wildlife Refuge (NWR). Fiber optics would be placed within the existing roadway to avoid impacting wetlands subject to approach by the USFWS; Alternative II would place the system in an existing fiber-optics conduit which also intersects Interstate 80. The latter would result in virtually no disturbance. Alternatively I would reaffect a previously disturbed railroad right-of-way and would not result in any substantial loss of native vegetation.

High-accuracy multiple-object tracking system (HAMOTS) sites

Construction and installation of the 50 additional HAMOTS sites would have insignificant effects on vegetation since little ground preparation is required, and the units can be removed and relocated. The locations are unknown at this time. Helicopters used to install the HAMOTS units would startle wildlife in the vicinity. This is likely to be a short-term effect, depending on the time required for installation of the entire system. If all 50 of these units were installed at different locations within a 400 square mile area (the approximate area of the TTA), over a period of a few years, the impacts of helicopter flights on wildlife would be short-term and insignificant. this would however, add to the impacts that operational activities would have on wildlife. If any raptor nests were located near one of the proposed locations of these units, adult birds could abandon their nests during the time the units are being installed. Eggs and/or

nestlings would then be subject to exposure and predation, and some loss of reproductive capability would result. Impacts could range from insignificant to significant depending on the type of bird, its sensitivity to disturbance, and the time required for installation. By avoiding peak nesting periods during HAMOTS placement and relocation, impacts to birds would be short-term and insignificant.

4.3.1.3 Impacts of operations in Tule Valley

Two general types of impacts from operations are discussed under the proposed action: impacts occurring as a result of operation and maintenance of the TTA and associated facilities, and impacts occurring as a result of overflights.

Operation and Maintenance of TTA and Facilities

Currently, human activity and traffic in Tule Valley is related to grazing sheep and cattle, mining, some farming, and recreation in the form of sightseeing, exploring, and hunting. By the year 2000, approximately 122 permanent staff will be operating out of the Sand Pass maintenance facility, and another 218 temporary workers will be traveling into the area for ECTC operations. Large vehicles will move the threat equipment from site to site. By the year 2000, an additional 227 vehicles will enter and exit the project area each day. The TTAs will be manned for approximately twelve hours each day. The RMF will house helicopters used to support the maintenance of the ECTC complex. Increased human and vehicular activity may impact the Swasey Point critical deer-watering area, which lies east of the road that will support TTA sites 10D and 10E. This road also passes through high-priority deer winter and summer range. Activities near sites 4G and 3C could also impact Coyote Springs, which is an important watering area for wildlife. The spring also provides critical habitat for the least chub, which

is a candidate species under the Endangered Species Act. [The threat site simulators emit radio-frequencies that could be harmful to wildlife. These impacts will be assessed when simulator activities are known.]

Aircraft Overflights and Mission Activities

Currently, an average of 5 military flights per day pass through Tule Valley at altitudes of less that 500 ft above ground level (AGL). With the proposed action, these flights will increase to 24 flights per day. ECTC flights will usually be conducted in groups, with about 25 percent of the flights occurring between 10:00 P.M. and 7:00 A.M. Noise generated by these flights may affect wildlife. Table 4.3-1 summarizes data on typical responses of wildlife to aircraft subsonic noise, sonic boom, and low-altitude overflight.

The effects of aircraft disturbances have also been summarized by Cottereau (1972; 1978), Lamp (1989), and the Environmental Protection Agency (EPA) (1980). Although the data are inconclusive, the following generalizations can be drawn from the literature: (1) wildlife sensitivity to aircraft noise is species-dependent; (2) birds are generally more sensitive than mammals, and solitary species of birds tend to be less sensitive than flocking or colonizing species; (3) raptors generally exhibit behavior responses to aircraft activity and noise, but nesting success is usually not impacted; (4) most species react to helicopter overflights more than to fixed-wing aircraft overflights; (5) low-level overflights of less than 500 ft AGL usually elicit greater responses than do sonic booms; and (6) wildlife response to intrusion by man is usually greater than that elicited by either low-level overflight or sonic boom.

Table 4.3-1 Summary of the effects of aircraft activity on wildlife.

Species	Type of noise	Effect	Elapsed time to resume normal activity	Comment
Desert/bighorn sheep (Lamp, 1989)	Supersonic booms (110± 0dB) Low-level overflights (<3,000')(98±6.9 dB and 89±6.9dB)	Minor reactions while feeding Minor reactions in behavior	30 sec 30 sec	NAS Fallon air operations and disturbances have minor impacts on bighorn sheep behavior. No conclusions on long-term impacts.
Muledeer (Lamp, 1989)	Supersonic booms (110± 7.1dB)	Minor reactions in feeding and resting behavior on winter ranges. Low and high level overflights (102±7.2dB and 95±8.1) caused minor behavioral reactions	1 minute 30 sec	NAS Fallon air operations have generally minor impacts on muledeer behavior.
Sage grouse (Lamp, 1989)	Supersonic booms Low-level and high-level overflights	Overflights did not occur during observations	N/A	Sage grouse populations exist in the NAS Fallon SOA area. Flight operations may not occur during early morning strutting activities.
Chukar (Lamp, 1989)	Supersonic booms Low-level overflight (<3,000') high-level overflight	Moderately sensitive while at water sources Impacted while at water sources No response	60 sec 57(±46.1 SD)	Chukar populations did not appear to be significantly impacted by NAS Fallon air operations.
Bald eagles (Wintering) (Lamp, 1989)	Supersonic booms Low-level overflight (3,000')	Sensitive Minor reaction	N/A	Sensitive to low-level overflight.
Nesting raptors: Golden eagle, red-tailed hawk, goshawk, prairie falcon (Lamp, 1989)	Supersonic booms Low-level overflight (3,000') High-level overflight	Sensitive--flushed from nest but no reproductive failure	37 sec(±22.5 SD) 14 sec(±7.3 SD) 17 sec(±6.2 SD)	Raptor migration routes should be considered in Fallon operations to avoid plane/bird strikes.

Table 4.3-1 Summary of the effects of aircraft activity on wildlife (Continued).

Species	Type of noise	Effect	Elapsed time to resume normal activity	Comment
Snow geese (Lamp, 1989)	Low- and high-level overflights	Flushing from water 32% of overflights	Low level 235 ($\pm$258.2) level 150 ($\pm$47.6)	Sensitive to low-level overflights.
Canada geese (Lamp, 1989)	Supersonic boom Low-level overflight High-level overflight	No response (1 event) Minor reaction 26% of events No response	N/A	Nesting success may be limited due to low-level overflights or other environmental causes.
Pintail, green-winged teal, and widgeon (Lamp, 1989)	Low-level overflight	Flushing and leaving the vicinity	N/A	Migrants into the area appear more sensitive.
Mallard, cinnamon teal, and gadwall (Lamp, 1989)	Low-level flight	Appear to tolerate overflight with little or no response		Species nest in the project area NAS Fallon study.
White-faced ibis (Lamp, 1989)	High-level overflight Low-level overflight (<3,000')	Major reactions to 13% of aircraft disturbances Flushing, leaving vicinity	60 sec 63 sec	Sensitive to low-level overflight.
Long-billed dowitchers (Lamp, 1989)	Low-level overflight High-level overflight	Flushing response	48 sec 43 sec	Major reaction during shorebird observations; migratory through area.
Great blue herons, double-crested cormorants, western grebes, american avocets, eared grebes	All aircraft disturbances	Tolerant of aircraft activities	N/A	All resident species of the study area.

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Table 4.3-1 Summary of the effects of aircraft activity on wildlife (Continued).

Species	Type of noise	Effect	Elapsed time to resume normal activity	Comment
House mice (Chesser et al., 1975)	Airport noise 80-120dB	Increased adrenal gland weight, indicating increased stress from noise or visual presence of aircraft	N/A	Increase stress from noise or visual presence of aircraft.
Snow geese (Salter and Davis, 1972)	Low altitude (300-10,000 ft AGL)		N/A	Flocks flush at greater distances when the aircraft is under 1,000 ft AGL. Geese can be driven from an area roughly 50 mi. within 15 minutes of "hazing" with a Cessna 185.
	300-400 ft AGL	All flocks flushed when 1-5 miles away		
	700 ft AGL	All flocks flushed when 2-9 miles away		
	1,000 ft AGL	All flocks flushed when 2-4 miles away		
	5,000 ft AGL	All flocks flushed when 2-5 miles away		
Herring gulls (Burger, 1981)	Subsonic non-SST 88-101dB(A)	No apparent reaction	N/A	Herring gulls react significantly to SST noise.
	SST overflight 101-116dB(A)	Increased flushing and fights in colony Increased egg damage and resulting egg predation		
Pronghorn antelope (Luz and Smith, 1976)	400 ft AGL distance 3,000 ft estimated 60dB(A)	No reaction observed	N/A	Area seldom overflown. Antelope may not have been adapted to helicopter noise.
	150 ft AGL distance 500 ft estimated 77 dB(A)	Strong reaction - running		
Cattle production. (EPA, 1980 from Parker and Bayley, 1960)	Low-level jet noise on dairy cattle near airbase	Found no effect in milk production	N/A	No impact on milk.
Cattle (EPA, 1980 from Lehman, 1966)	Sonic booms	Little effect on milk production	N/A	Cattle may have grown accustomed to sonic booms in study.

Table 4.3-1. Summary of the effects of aircraft activity on wildlife (Continued).

Species	Type of noise	Effect	Elapsed time to resume normal activity	Comment
Cattle (EPA, 1980 from Bond, 1956)	Exploding paper bags	Cattle would stop giving milk for 30 minutes, 70% of normal production after sound stimulation	30 minutes	Bond noted that reactions to low subsonic aircraft were more pronounced than to sonic boom.
Cattle (EPA, 1980 from Fletcher, 1980)	Low-level flight, flying paper, strange persons, moving objects	Startled reaction similar in all cases	N/A	Fright reactions may occur more strongly when an animal sees rather than hears the object.
Horses (EPA 1980 from Cassaday and Lehman, 1966)	Jet flyovers	Jumping, galloping, apparent fright reactions	N/A	Usually controllable; thoroughbreds may react.
Bats (EPA, 1989 from Griffin et al., 1963)	Various noises and sounds	Bats can avoid masking by orienting themselves so that noise and signals are received from different angles	N/A	Indicates an adaptive response or coping mechanism.
Birds (EPA 1980 from Committee on the Problem of Noise, 1963)	85dB noise level at the bird's ear	Required to scare birds away	N/A	Birds quickly habituated, and it was recommended not to use distress or noise more than 2 minutes every 20-30 minutes.
Desert iguana	ORV noise 114dB	Produced hearing loss	N/A	ORV noise >114dB could impact some desert species.
Spadefoot toad (EPA, 1980 from Bondello and Brattsfrom 1976)	ORV noise	Toads may mistake ORV noise for thunder and emerge from their burrows in the wrong season	N/A	Toads did not reburrow after emerging in lab tests.

Table 4.3-1. Summary of the effects of aircraft activity on wildlife (Continued).

Species	Type of noise	Effect	Elapsed time to resume normal activity	Comment
Mink (Brewer, 1974)	Sonic boom	No interference with breeding	N/A	No impact to reproductive success of farm-raised mink.
Poultry (Brewer, 1974 from Heinemann, 1965)	Sonic boom over-pressures of 3-18 (psf)	No effect in hatch rate	N/A	N/A
Unspecified Passerine birds (Higgins, 1974)	Sonic boom (1.15 mean psf)	Stopped bird songs 4-8 seconds prior to the arrival of sonic boom. "Raucous discordant cries" for a few seconds during boom	10 sec	Indicates that birds are able to detect approaching sound or pressure waves.
Peregrine falcons, other raptors (Ellis, 1981)	Low-level jet overflight and sonic boom	Noticeably alarmed; however, never productivity limiting	N/A	Peregrine eyries often found in supersonic military operations areas.
Wading bird colonies (Black et al., 1984)	Low-level 3,500 ft AGL in military operations areas in Florida F-16 overflight up to 100 dBA	No demonstrated effect on colony establishment or size on a state-wide basis	N/A	Most severe potentially productivity-limiting responses were elicited by humans. Great egrets and cattle egrets demonstrated the greatest response.

A study conducted on the effects of Naval Air Station, Fallon air operations on wildlife by Lamp (1989) addressed air operations and species similar to those found on the UTTR. Lamp concluded that Fallon air operations, which included low-level subsonic and supersonic flight activity, had minimal impact on desert bighorn sheep and muledeer. Sage grouse strutting activity peaked in the early morning before onset of air operations and afforded little potential for conflict. Chukar partridge at watering holes were sensitive to low-level overflight. Migratory birds, such as bald eagles, snow geese, green-winged teal, pintail, widgeon, and long-billed dowitchers, were sensitive to low-level overflights; however, birds that nested under the Supersonic Operating Area, such as the Swainson's hawk, golden eagle, cinnamon teal, mallard, gadwall, american avocet, great blue heron, double-crested cormorant, western grebe, and eared grebe, appeared to habituate or adequately adjust to aircraft overflight. These species occur in the project area, and could be affected by increased overflights, especially at the program's peak level of activity.

Undoubtedly, wildlife will react to low-altitude overflights and sonic booms, but the available data are inconclusive as to the long-term effects. Although the ECTC mission will, in many cases, involve multiple aircraft flying in groups, the combined noise produced by two identical jets is generally only about 3 dB higher than that produced by either aircraft operating alone (Manci, 1988).

For example, Pronghorn antelope were unaffected by a 400 ft AGL helicopter approaching at a distance of 3000 ft and did not react by running until the aircraft had closed to a distance of 500 ft at an altitude of 150 ft (Luz and Smith, 1976). Considering the width of Tule Valley and the approach options available to pilots, overflights within 500 ft of antelope herds are not expected to occur in sufficient numbers to impact the species.

The term "masking" is used to describe noise effects that disrupt a species' normal means of communication. Continuous and long-term noises have the greatest masking potential in that they can impact communications essential to reproductive behavior and social structure. Masking can also alter predator-prey relationships (i.e., prey may not hear an oncoming predator). Typical ECTC mission profiles will be of relatively short duration, will be scattered over a large area, and are not expected to significantly impact or mask species communications. Constant use of the diesel generators at the threat sites could, however, mask communication of those species that reside near the sites and are less mobile than larger species.

On-the-ground human activity usually elicits a greater response in wildlife than does either low-level overflight or sonic boom. Activities associated with the operation of the threat sites may have a greater impact on wildlife than those of aircraft overflight. Activities such as travel to and maintenance of the sites will be of much longer duration than those of air operations, and will include the presence of man. Most large mammals, such as pronghorn antelope, coyotes, and wild horses will avoid areas near manned threat sites. Harassment of species near critical watering areas could have long-term and significant negative impacts on dependent species. Activities near bird nesting areas, especially wetlands, could impact nesting success due to nest abandonment and exposure of the eggs to the elements and predators.

The use of chaff and flares is needed to simulate realistic combat conditions. Approximately 107,270 chaff and 14,326 flare drops are proposed to be used during a normal year-long testing period, by the year 2000. Currently, UTTR-related chaff and flare drops are confined to the airspace over DOD land, and amount to 360 chaff and 200 flare drops in a typical training year.

Chaff is typically a 0.003 inch-diameter, 1 to 1-1/2 inch-long fiber of type-E glass monofilament coated with aluminum of 99.0 percent purity with a second coating of stearic acid to aid in dispersal. At the present time, drops are not conducted when the winds exceed 15 knots from the west. While deterioration data is not available, Nellis AFB has conducted an average of 50 drops per week for the last eight years without detectable accumulations or complaints (Nellis AFB Range Safety Officer, pers. comm. 1989). The new chaff is also reported to be a biodegradable form; however, data on biodegradability were not available at the time of this publication.

Flares consist of a magnesium pellet attached to a bracket that is ignited when it is discharged from the aircraft. Flares will not be discharged at altitudes of less than 1,500 ft AGL. The flares burn for approximately 5 seconds, during which time they will fall approximately 500 ft. Improved design and drop restriction ensure that fire hazards are minimal. However, if burning flares were to reach the valley floor, there would be a potential for range fire. Many areas, however, lack sufficient vegetative cover to support a fire. Vegetation on the lower and upper mountain slopes could support a range fire and would be at a significant risk. Range fire in these areas could destroy important habitat if not controlled.

4.3.2 IMPACTS OF ALTERNATIVE VALLEY CONFIGURATIONS

4.3.2.1 Snake Valley

Impacts of TTA Construction

The proposed layout for the TTA in Snake Valley and its relationship to ecologically sensitive areas (as defined in Chapter

3) is shown in Figures 4.3-2 a, b, c, and d. The proposed TTA is located in the northeastern portion of the valley, west of the Confusion and Fish Spring Ranges.

As is the case with Tule Valley, Snake Valley construction activities would occur primarily at the lowest elevations, extending into the lower bajadas of the Confusion Range. Constructing the TTA, widening main roads, widening access roads, widening trails, and installing the fiber-optics network would result in a permanent loss of approximately 840 acres of salt desert shrub and Great Basin sagebrush vegetation, most of which is adjacent to existing roads. This loss of vegetation would be a permanent but insignificant impact due to the widespread distribution of this community type in the region, and the fact that most of the disturbed vegetation would be adjacent to already existing roads.

Impacts to wildlife would be generically similar to those described under the proposed action, but potentially more severe due to: (1) an increase in the amount of UDWR-designated critical value habitat potentially disturbed, (2) an increase in the number of critical watering areas and sites for wildlife occurring within the TTA area, and (3) the close proximity of TTA sites to sensitive aquatic habitat.

The TTA is located almost entirely in High Priority Value pronghorn habitat, except in the extreme north, which is designated Substantial Value pronghorn habitat. Impacts to pronghorn from construction of the TTA in Snake Valley would be short-term and insignificant. There are approximately 50 critical watering areas and sites for wildlife in northern Snake Valley; many of these are in the Deep Creek Range, which also is designated High Priority winter range for muledeer. Most critical watering areas would be

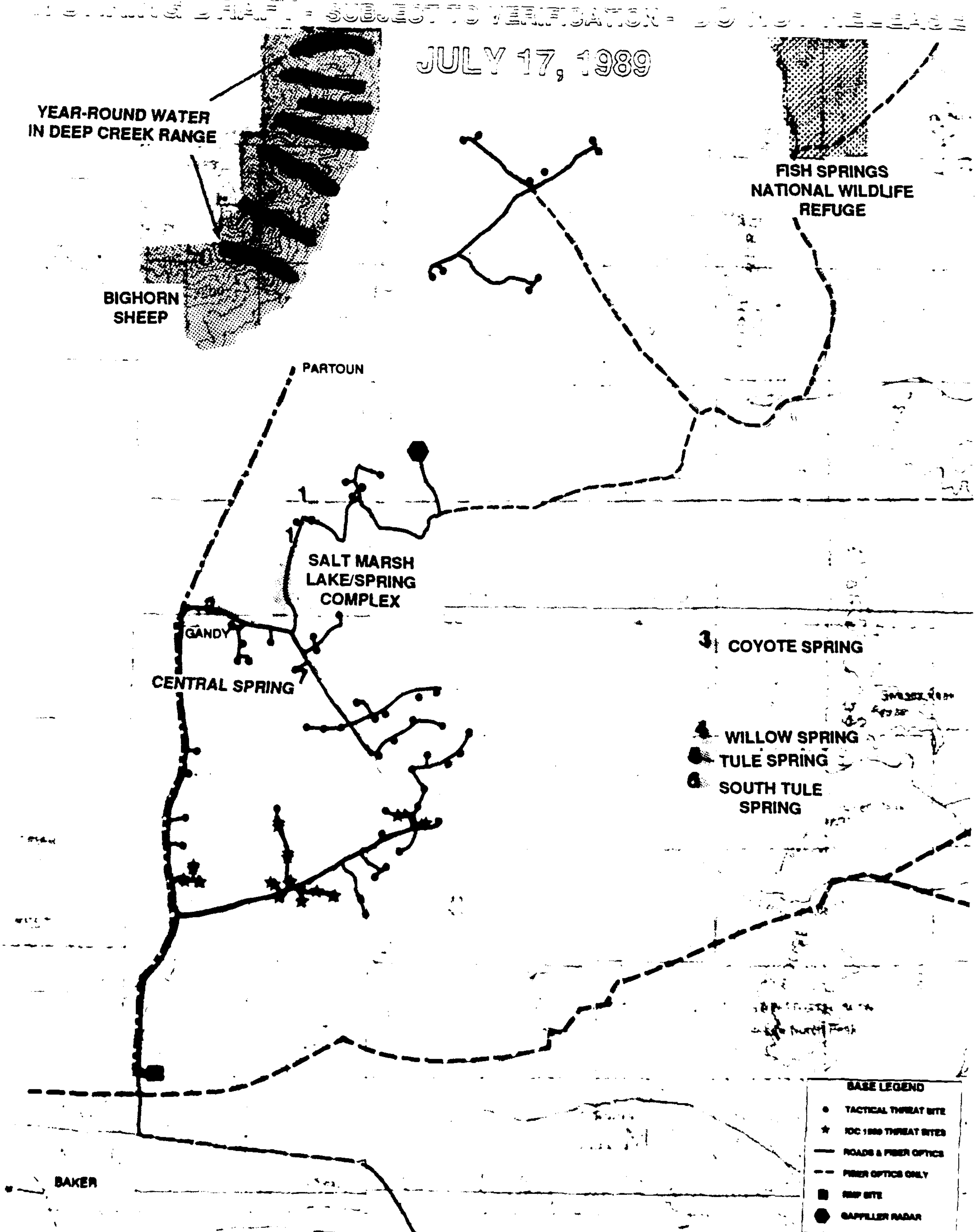

Figure 4.3-2a. Construction locations and sensitive aquatic and bighorn sheep habitat in Snake Valley.

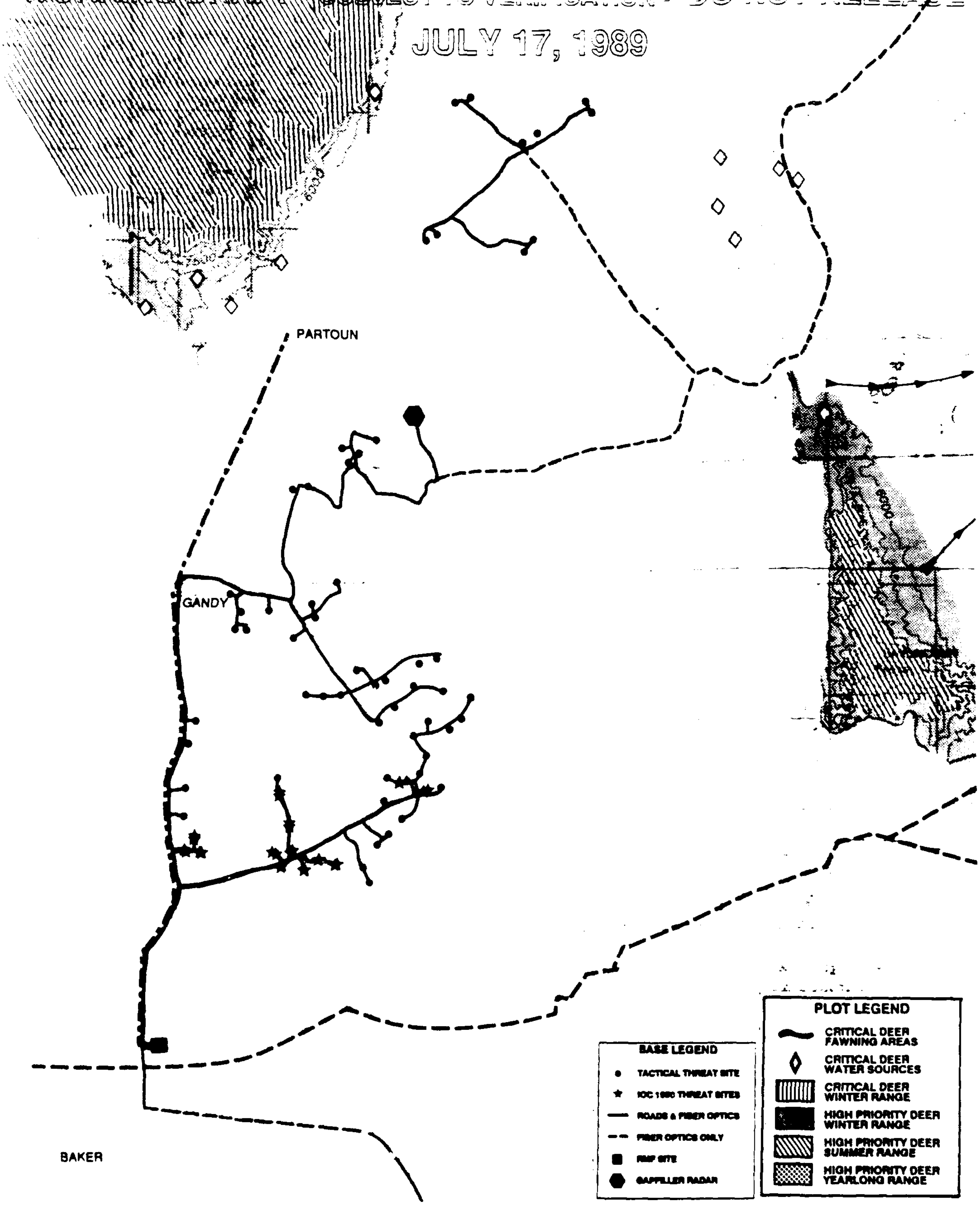

Figure 4.3-2b. Construction locations and critical muledeer habitat in Snake Valley

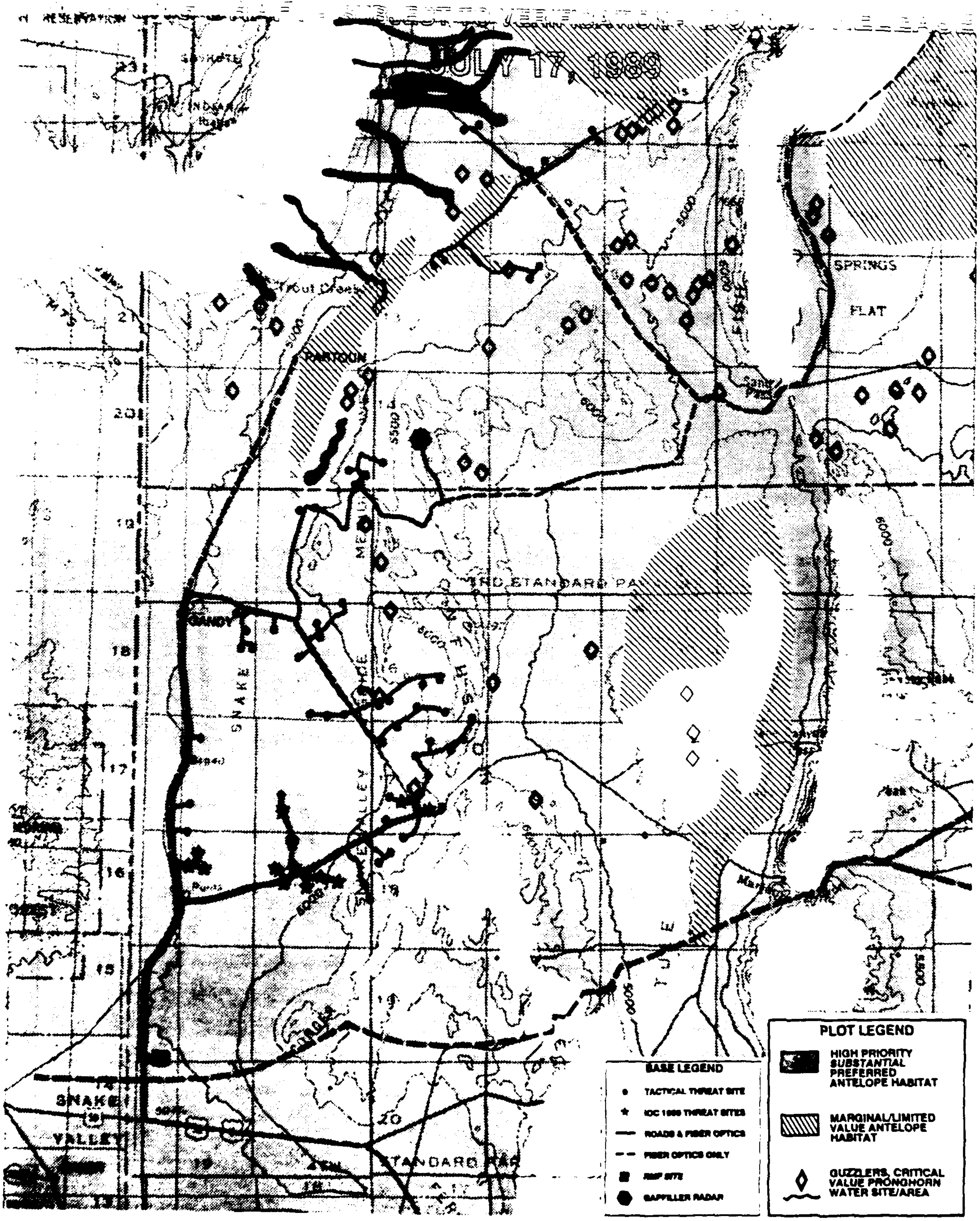

Figure 4.3-2c. Construction locations and critical antelope habitat in Snake Valley.

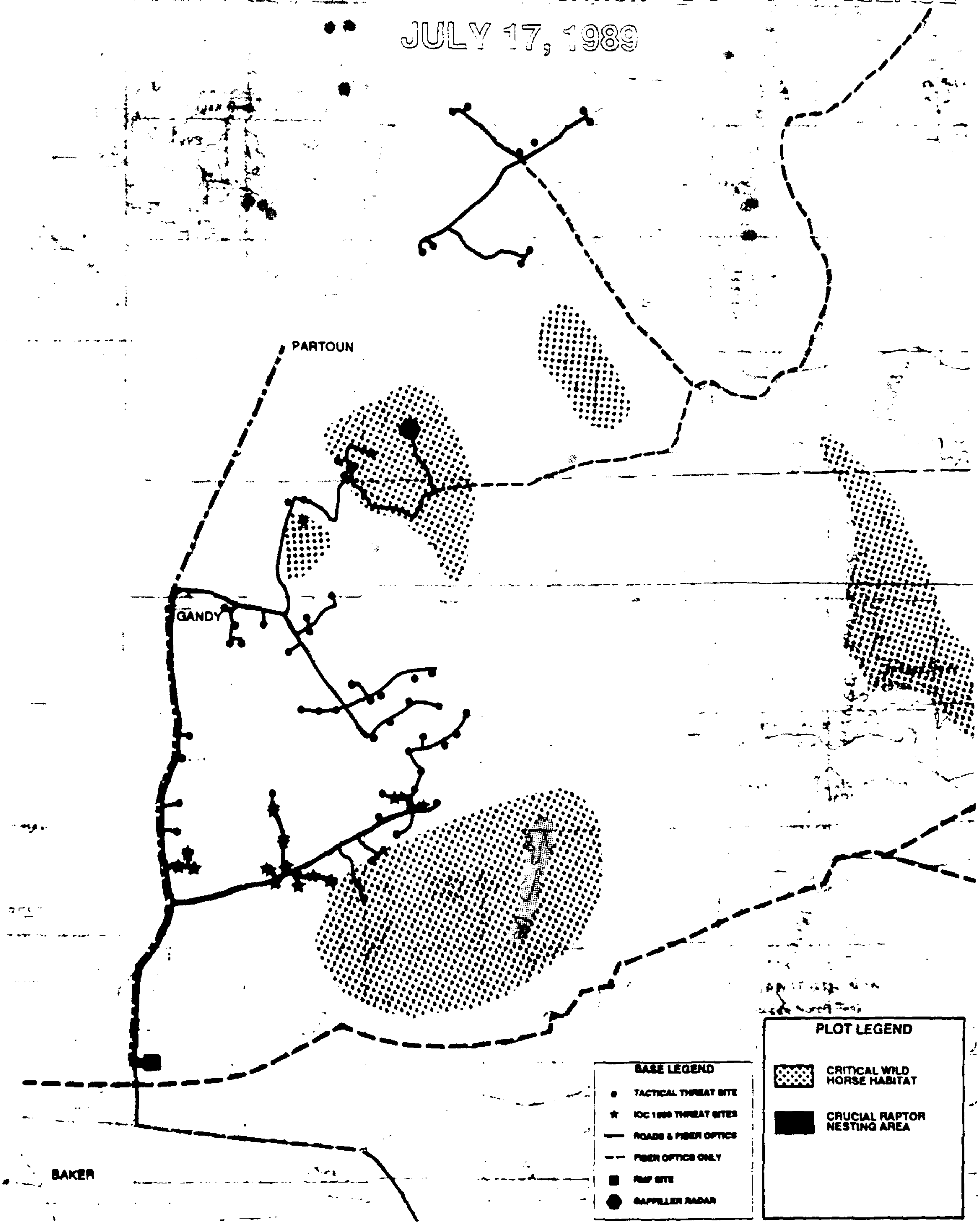

Figure 4.3-2d. Construction locations and critical wild horse and raptor habitat in Snake Valley.

avoided during construction. The wildlife attracted to these watering areas could be temporarily impacted by construction activities in the areas.

TTA sites S3A, S3B, and S5D are located near Twin Springs, which contains habitat for the least chub, a fish that is a candidate for Federal listing as endangered. Proposed road improvements in this vicinity cross areas which supply water to the springs. Ground disturbing activities associated with road improvement and placement of fiber-optics could alter the hydrology in the area and the resulting water supply to the springs. Fugitive dust from construction activities could also degrade water quality. Impacts to this species would be significant.

The Twin Springs area is also heavily used by waterfowl and shorebirds, which could abandon watering areas during heavy construction periods. These birds also feed in these areas, and a degradation of water quality caused by road improvements could potentially affect future food sources. Installation of power lines could pose a flight hazard to migratory waterfowl and shorebirds using the area. These effects would be significant, given the large numbers of these species in the area. There have been no confirmed sightings of candidate bird species in the area; no impacts from construction would be anticipated.

Although there are reported sightings of bald eagles and peregrine falcons in Snake Valley, construction is not likely to affect these species. There are no known roosts or nest sites in the valley, and the species are generally only transient in the area.

No plant species that are candidates for Federal listing are likely to be affected by construction of the Snake Valley TTA. Surveys of FY 1990 construction sites and associated roads did not result

in the identification of any candidate plant species in the vicinity.

Impacts of Construction of Snake Valley Facilities

Range Maintenance Facilities (RMF)

Two RMFs will be constructed under this alternative, one immediately north of U.S. Highway 50 in the central portion of the valley, the other at Wendover, on the border of Utah and Nevada. Construction of the Snake Valley RMF would disturb approximately 160 acres of desert scrub vegetation that is grazed both by wildlife and livestock. Although the loss of this vegetation would constitute a long-term impact, this impact would not be significant because of the widespread distribution of this vegetation in this region. Construction activities would also permanently displace small animals that reside in or utilize the area of disturbance. these impacts would not be significant. Big-game animals such as muledeer and pronghorn would temporarily abandon the area during construction. This would be a short-term, insignificant impact. There are no known locations of protected species in the vicinity of the proposed RMF. Field surveys to identify mid and late-blooming protected plant species on site will be completed this summer. However, the area was not surveyed for early-blooming (May) plant species as the locality of the site was not confirmed at the time. No impacts are anticipated.

Impacts of construction of the RMF at Wendover would be similar to those described above. The Wendover Airfield would be expanded to accommodate the proposed buildings and work areas. Little undisturbed native vegetation remains in the proposed construction area, therefore impacts would not be significant. No protected species would be affected by construction.

Gapfiller Radar Site

The proposed site for the gapfiller radar site is on Tunnel Springs Mountain, which is located about 20 miles northwest of Frisco Peak. Existing access roads and power lines would be used to supply access and power. Clearing of the site and improvement of access roads would disturb about 60 acres of juniper and Great Basin sagebrush vegetation (mostly black sage, Artemisia nova). Two candidate plant species, the Tunnel Springs penstemon (Penstemon concimmus) and the Frisco Clover (Trifolium andersonii var. eriscanum) could be affected by construction or improvements in this area. Although this is a species of special concern, there are numerous localities in Pine and Wah Wah Valleys, located immediately to the south (HDR, 1981). The loss of a few individuals of this species would be adverse, but not significant. Field surveys to identify any protected species on site and in the vicinity will be completed prior to construction.

Mission Control Center

The proposed site for the MCC is at Hill AFB, the same as for the proposed action. Impacts of construction at this location are discussed under the proposed action.

Impacts of Operations in Snake Valley

Effects from operations in Snake Valley would be generically similar to those described under the proposed action, but the resources affected differ. Under this alternative, aircraft would pass over BLM-designated wild horse areas, a critical raptor nesting area near Conger Mountain in the Confusion Range, and the Twin Springs wetlands. Waterfowl residing in the area could be disturbed by overflights as discussed under the proposed action. There is also a greater potential for bird-aircraft strike hazards.

Low-level flights would pass over the southern end of the Deep Creek Mountains, which contain critically-valued deer watering sources, high priority deer winter range, and critically valued fawning areas.

4.3.2.2 Whirlwind Valley

Impacts of TTA Construction

The proposed layout for the TTA in Whirlwind Valley and its relationship to ecologically sensitive areas (as defined in Chapter 3) is shown in Figures 4.3-3a, b, c, and d. The TTA is located in Swasey Bottom, at the north end of Whirlwind Valley, and along the east side of Fish Springs Flat, which is north of Swasey Bottom. As with the proposed action and the Snake Valley alternative configuration, construction is planned for the lower elevations and bajada areas. Widening of roads, constructing the TTA, and installing the fiber-optics network would result in the loss of approximately 800 acres of salt desert shrub and Great Basin sagebrush vegetation, most of which lies adjacent to existing roads. This is a long-term, but insignificant, impact given the wide distribution of this vegetation in the area.

Construction of the TTA sites would disturb BLM-designated critical wild horse areas in the House Range, high-priority muledeer summer and winter range in the House Range and the Little Drum Mountains, and high-priority value pronghorn habitat. TTA clusters 5 and 8 would impact high-priority year-long habitat for muledeer. Construction of the TTA would cause these big-game species to abandon these areas, and could alter the nature of the habitat enough to prevent their return in the same numbers as before construction. This would be a significant local impact. Construction of the TTA is not likely to directly affect any

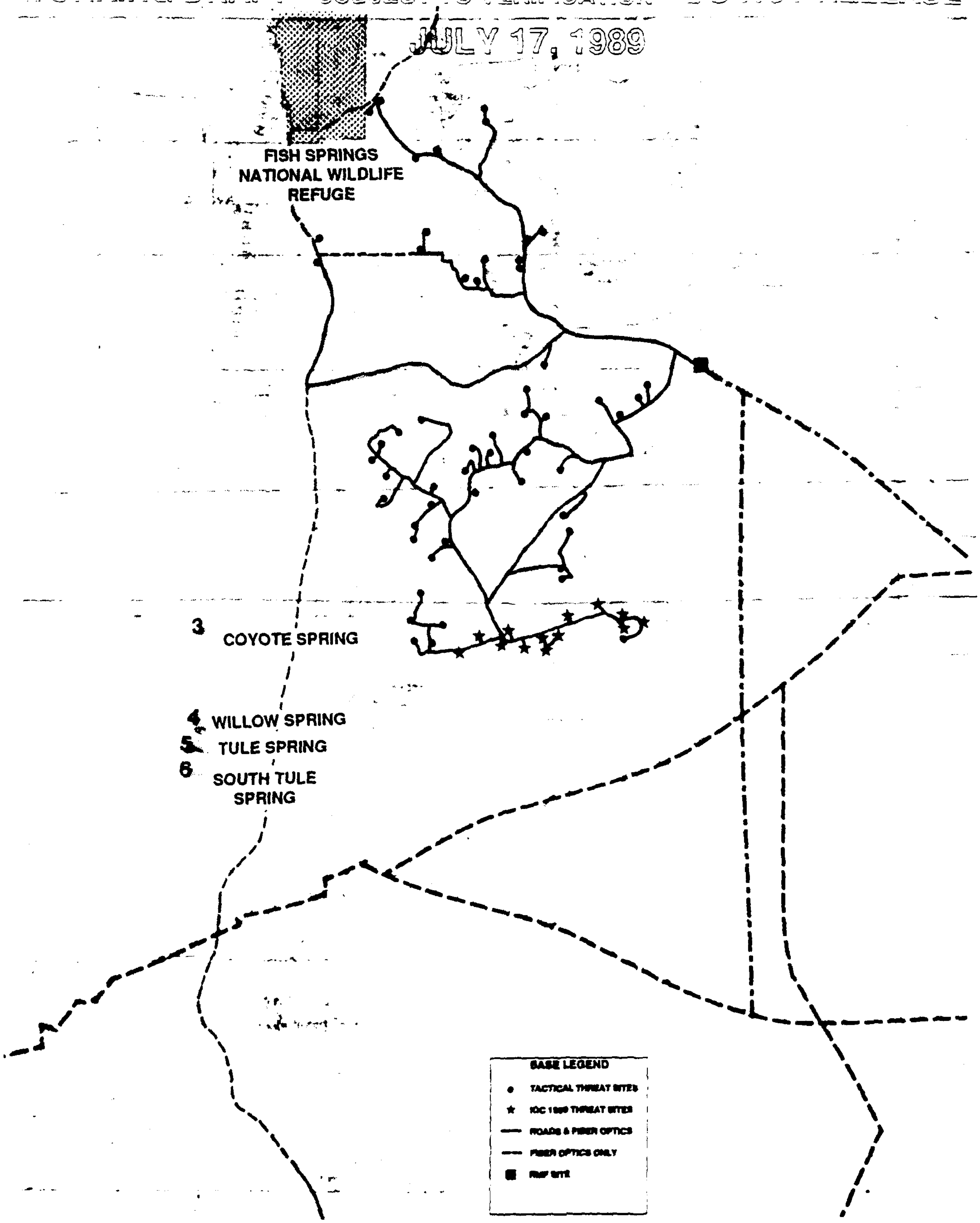

Figure 4.3-3a. Construction locations and sensitive aquatic and bighorn sheep habitats in Whirlwind Valley.

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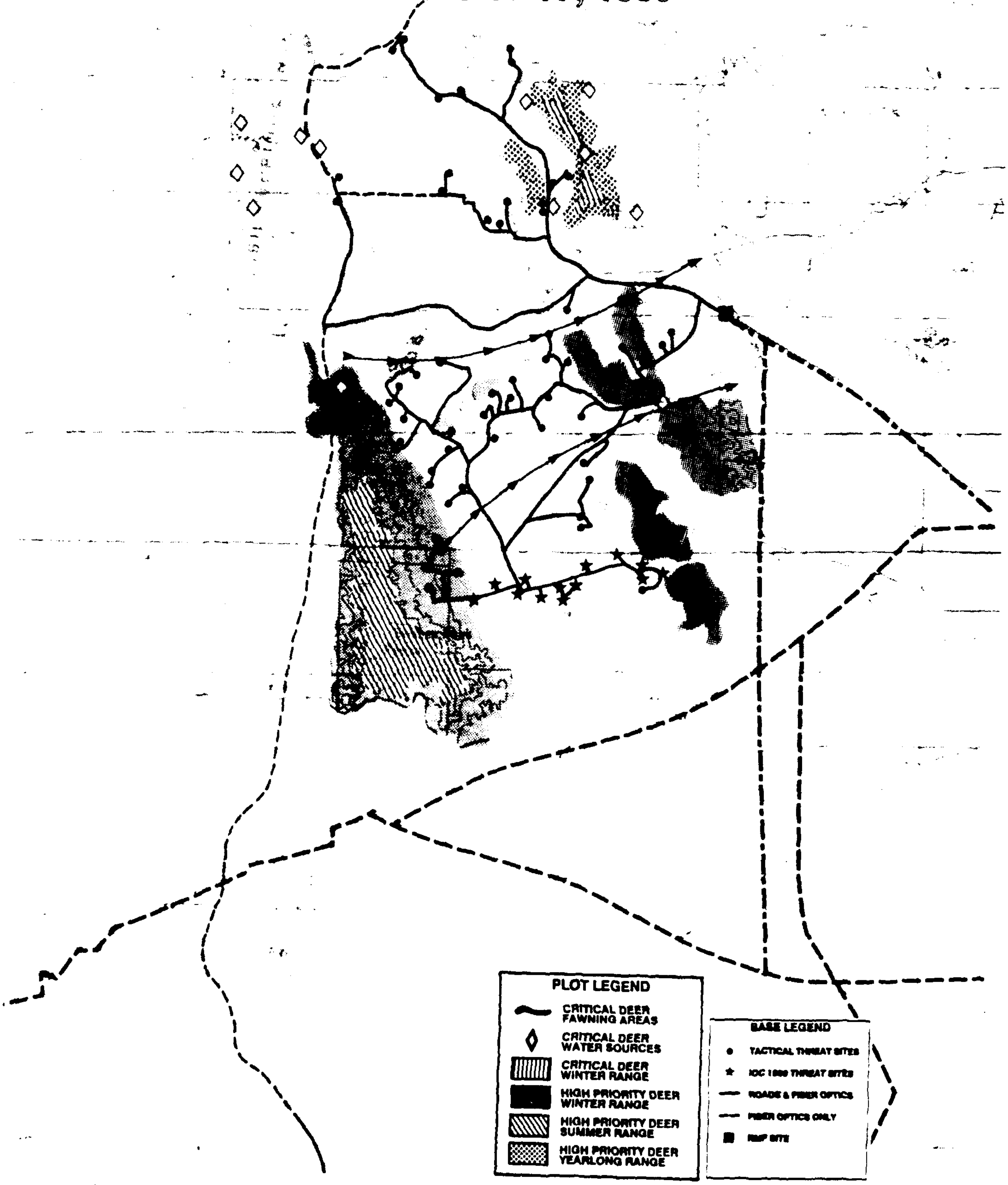

Figure 4.3-3b. Construction locations and critical muledeer habitat in Whirlwind Valley.

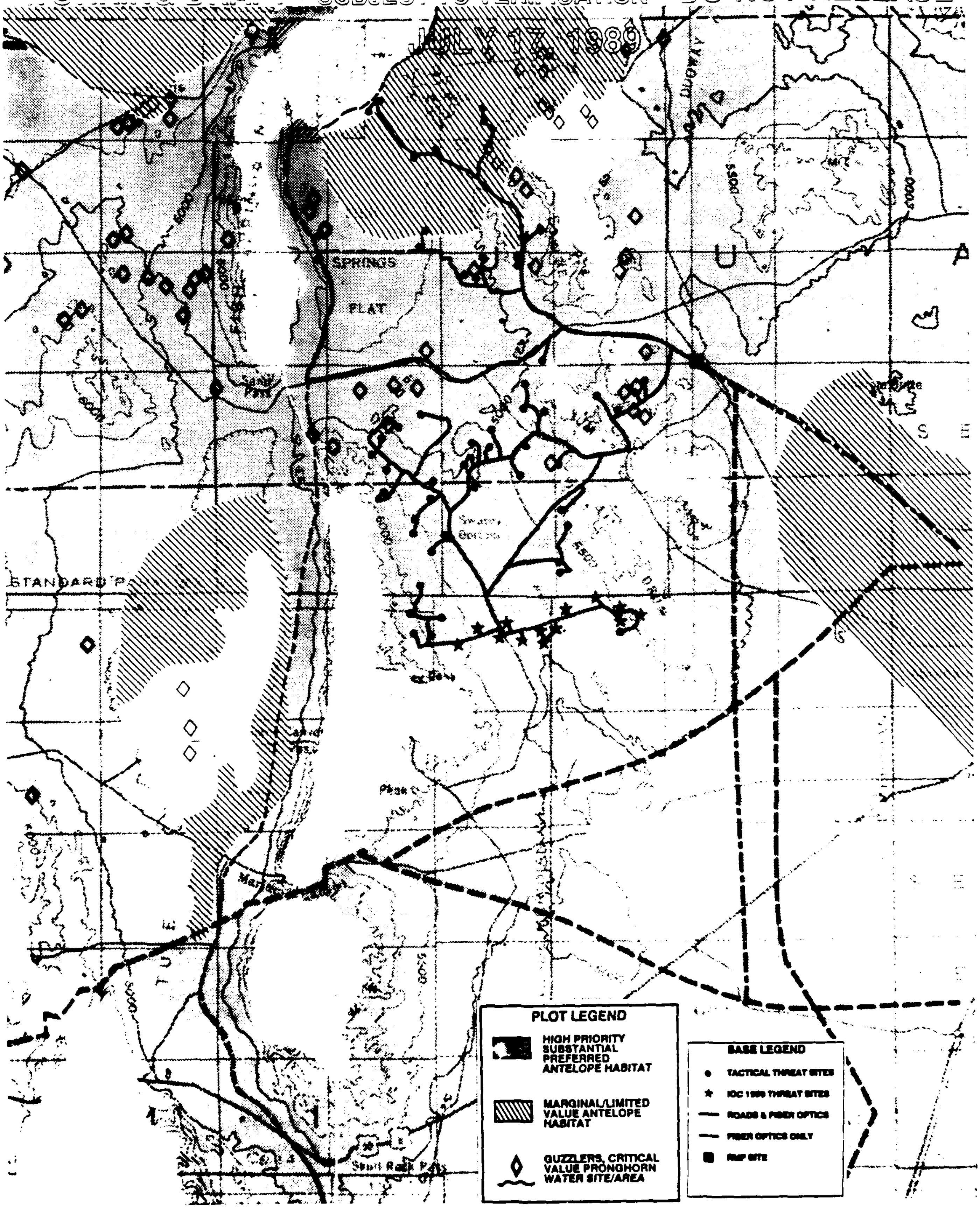

Figure 4.3-3c. Construction locations and critical antelope habitat in Whirlwind Valley.

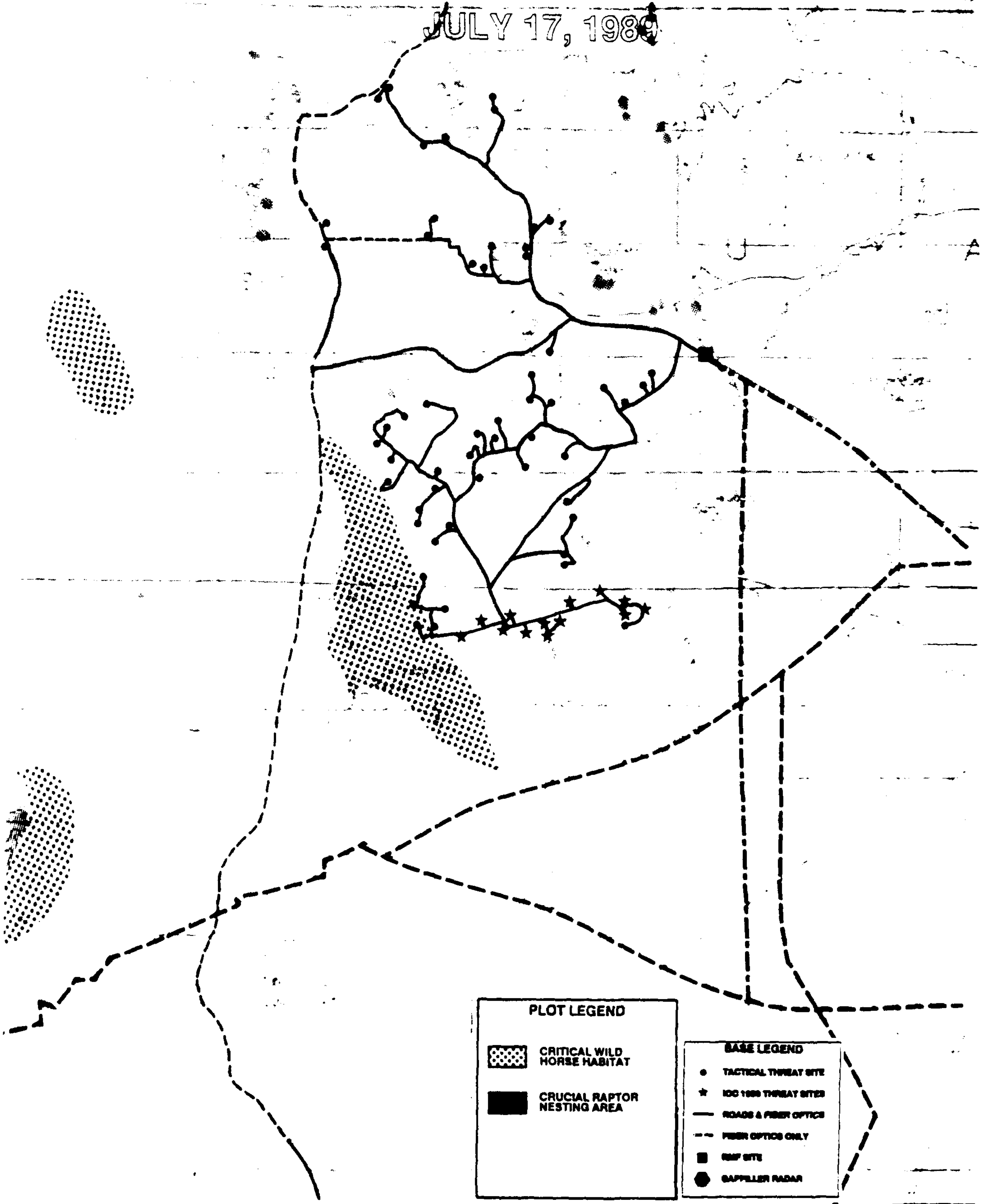

Figure 4.3-3d. Construction locations and critical wild horse and raptor habitats in Whirlwind Valley.

threatened or endangered species. One candidate plant species (Astragalus uncialis) is known to occur south of Whirlwind Valley (S. Welsh, et. al. 1987). Although there could be potential habitat for this species within the proposed TTA area, surveys conducted for the FY 1990 construction sites did not result in any new locations for this species or any other candidate species. Additional surveys would be conducted for the sites to be constructed at a later date. Impacts are not anticipated.

Impacts of Construction of Whirlwind Valley Facilities

Range Maintenance Facilities (RMF)

Two RMFs will be constructed under this alternative, one near Topaz Valley in the Drum Mountains, the other at Wendover, on the border of Utah and Nevada. construction of the Topaz Valley RMF would disturb approximately 160 acres of salt desert shrub and Great Basin sagebrush vegetation. Although the loss of this vegetation would constitute a long-term impact, this impact would not be significant because of the widespread distribution of this vegetation in this region. Construction activities would also permanently displace small animals that reside in or utilize the area of disturbance. These impacts would not be significant. Big-game animals such as muledeer and pronghorn would temporarily abandon the area during construction. This would be a short-term, insignificant impact. No protected species would be affected by construction of the RMF in Topaz Valley. Surveys for protected species would be conducted prior to initiation of construction.

Impacts of construction of the RMF at Wendover would be similar to those described under the proposed action. The Wendover AA would be expanded to accommodate the proposed buildings and work areas. Little undisturbed native vegetation remains in the proposed

construction area, therefore impacts would not be significant. No protected species would be affected by construction.

Gapfiller Radar Site

The proposed site for the gapfiller radar system is Frisco Peak, the same as for the proposed action. Impacts of construction at this location are discussed under the proposed action. Existing roads and power lines would be used to supply access and power to the site.

Mission Control Center

The proposed site for the MCC is at Hill AFB, the same as for the proposed action. Impacts of construction at this location are discussed under the proposed action.

Impacts of Operations in Whirlwind Valley

Effects from operations in Whirlwind Valley would be generically similar to those described under the proposed action. The primary difference from an operational standpoint is that aircraft overflights would ultimately be directed over the Fish Springs NWR, which is located about 20 miles north of most of the TTA sites, but is within a few miles of some of the more northern threat sites. Peregrine falcons and bald eagles, both Federally listed as endangered species, and at least three other candidate bird species (breeding western snowy plovers, long-billed curlews, breeding white-faced ibis) could be adversely affected by low-level flights in this area. Up to 10,000 migratory birds winter at the refuge, and substantial numbers nest during the spring and summer. Given the close proximity of threat sites to the refuge's wetland areas, it is likely that overflights could cause disruption during nesting times, even though Air Force Regulation 55-18 advises pilots to fly

at 2,000 feet AGL above the refuge. Impacts on the candidate species would be significant.

Aircraft overflights would also pass over high-priority muledeer winter, summer, and year-long range areas, and critically-valued wild horse areas.

4.3.3 ALTERNATIVE STAGING BASES

4.3.3.1 Hill AFB

No substantial land disturbance or expansion of Hill AFB boundaries would occur under the proposed action. The proposed additional facilities would be constructed in previously disturbed areas. No impacts to ecological resources are expected.

Increased aircraft activity at Hill AFB would not result in significant impacts to wildlife. An increase in the number of flights leaving Hill AFB could result in minor impacts on avian species residing in waterfowl management areas; however, no low-level flight is proposed for these areas.

4.3.3.2 Michael Army Airfield

Approximately 40 acres of previously disturbed desert shrub vegetation would be lost as a result of upgrading and lengthening the existing runway 4,000 feet. This loss of vegetation would not be significant since the area is previously disturbed. Increased aircraft activity at Michael AAF will not cause significant impacts to vegetation or wildlife. The base is currently active.

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4.3.3.3 Salt Lake City International Airport (SLC)

Increased aircraft activity at SLC would not cause significant impacts to ecological resources. The area surrounding the airport is already highly disturbed.

4.3.3.4 Wendover

Impacts of construction of staging facilities at Wendover would be similar to those identified for construction of the RMF in this area. There is little undisturbed native vegetation in the area; no impacts to ecological resources are anticipated. The area is currently used by aircraft; an increase in activity in the area would not result in any impacts to wildlife resources.

4.3.3.5 Delta

Construction of staging facilities at Delta would impact farmland located south of the existing airfield, and small amounts of rangeland and greasewood vegetation bordering the existing facilities. Although there would be a permanent loss of this vegetation, the anticipated acreage is low, and it is abundant in the vicinity. Impacts would be adverse, but not significant. Since this is not currently being used as a military airfield, increased aircraft operations in this vicinity could affect wildlife as discussed under the proposed action.

4.3.3.6 Fillmore

Construction of staging facilities at Fillmore would impact farmland in the vicinity. Since the surrounding land has been previously disturbed, construction would not significantly affect vegetation. As is the case with Delta, this area is not currently being used as a military airfield. Increased aircraft operations

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in this vicinity could affect wildlife as discussed under the proposed action.

4.3.4 MITIGATION

4.3.4.1 Proposed Action

The potential for significant impacts from construction will be reduced by using the following mitigations:

- o Road widths will be reduced to the maximum extent practicable to reduce the amount of ground disturbance.

The potential for significant impacts from operation and maintenance of the ECTC facilities and missions will be reduced by using these mitigations:

- o Use of threat sites near critical wildlife habitat such as waterfowl concentration areas, raptor hacking-project areas, and important breeding grounds will be curtailed during sensitive periods.

- o Helicopter overflights from the RMF that pass over critical wildlife habitat such as raptor nesting areas and wetlands such as Coyote Springs will be limited to those essential for HAMOTS installation and required maintenance of sites.

- o Use of electrical generators will be limited to the minimum time needed to conduct exercises and necessary maintenance.

- o All proposed facility, threat site, and road locations will be surveyed to ensure that threatened and endangered species are protected.

- The electrical transmission line alignment in Whirlwind Valley could be used for the Tule Valley RMF, eliminating the need to place such a line at the base of the House Range.

4.3.4.2 Alternative valleys

Snake Valley

The potential for significant impacts occurring as a result of construction and operations in Snake Valley will be reduced by using these mitigations:

- Overflights over Twin Springs will be avoided during sensitive use periods.

- Flight altitudes over these areas could be adjusted to reduce impact to sensitive species.

- Threat sites located near Twin springs and the Salt Marsh area will be relocated to reduce the impact on aquatic habitats and the least chub, a candidate for Federal listing as endangered.

- A stand-off distance of at least 0.5 miles will be maintained for all wetland and watering areas.

- The power line alignment for Snake Valley will be altered to connect with the transmission line south of the RMF, thus reducing the length of above-ground transmission line needed.

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Whirlwind Valley

The potential for significant impacts occurring as a result of construction and operations in Whirlwind Valley could be reduced by using these mitigations:

- o Overflights over Twin Springs will be avoided during sensitive use periods.
- o Flight altitudes over these areas could be adjusted to reduce impact to sensitive species.
- o The threat sites in the northernmost portion of the valley could be relocated further south to allow aircraft an adequate distance to reach a minimum AGL of 2,000 feet.

4.3.5 UNAVOIDABLE ADVERSE IMPACTS

4.3.5.1 Proposed action

Construction of the ITA, STA, TTA, the MCC, two range maintenance facilities, and a gapfiller radar unit and associated fiber-optics, power, and transmission lines would result in the loss of approximately 1,400 acres of vegetation. Muledeer, pronghorn, and wild horse populations may temporarily abandon the construction areas. Some migration patterns of these wildlife species would be affected in the short-term. Increased human activity in the valley could cause these species to abandon some high-use areas. Increased aircraft activity will result in more frequent noise and startle incidences. While numerous studies have been conducted on the behavioral responses of wildlife to human and aircraft disturbances, little is known about the long-term effects on populations.

4.3.5.2 Alternative valleys

Snake Valley

Construction of the ITA, STA, TTA, the MCC, two range maintenance facilities, and a gapfiller radar unit and associated fiber-optics, power, and transmission lines would result in the loss of approximately 1,500 acres of vegetation. Other unavoidable impacts would be the same as the proposed action.

Whirlwind Valley

Construction of the ITA, STA, TTA, the MCC, two range maintenance facilities, and a gapfiller radar unit and associated fiber-optics, power, and transmission lines would result in the loss of approximately 1,400 acres of vegetation. Increased aircraft activity over Fish Springs NWR will result in more frequent flushings of avian species. This could in turn cause some species, including some that are candidates for Federal listing as endangered, to abandon some high-use areas, and may result in decreased reproductive success. Other unavoidable adverse impacts would be the same as the proposed action.

4.4 UNIQUE FEDERAL LANDS

Impacts to unique Federal lands from implementing the ECTC will result primarily from noise caused by low-flying military aircraft, and the effects that this noise could have on management of these lands. Construction impacts are limited to Fish Springs National Wildlife Refuge where a fiber-optics line would be constructed.

The method used to evaluate impacts was as follows: (1) the locations of all unique Federal lands in the affected region were plotted on a base map; (2) a map showing the construction sites and likely flight paths was prepared at the same scale as the map described in (1); and (3) the maps described in (1) and (2) were superimposed to determine the coincidence between ECTC construction/operations and unique Federal lands.

The significance of impacts to unique Federal lands was judged primarily on (1) an estimate of the daily duration and loudness of jet noise heard within these lands, and (2) whether ECTC activities are compatible with other Federal laws and requirements for protection of the environment.

4.4.1 PROPOSED ACTION

4.4.1.1 Construction

Fish Springs National Wildlife Refuge is the only unique Federal land that would be affected by ECTC construction activities under the proposed or alternative actions. An approximately 5.5 mile long segment of fiber-optics line is proposed for construction across the southern end of the refuge. About half the length of the line (2.75 miles) would be constructed along an existing road, whereas the other half would result in new disturbances of the

refuge. The width of disturbance along the proposed route would be about 10 ft.

The proposed construction is not expected to cause serious problems with management of the refuge (impacts to wildlife from ECTC construction are described in Section 4.3). Nevertheless, before any construction could begin, a special-use permit must be applied for and acquired from the U.S. Fish and Wildlife Service (USFWS). If granted, this permit would specify conditions to the permit that would protect the refuge from potential adverse impacts.

Construction of a fiber optic line through Fish Springs National Wildlife Refuge is proposed under each valley alternative. No other ECTC construction is proposed within any other unique Federal lands.

4.4.1.2 Operations

Wilderness Study Areas (WSAs)

By the year 2000 the proposed action will result in an average of 24 low-altitude flights per day passing near and directly over WSAs shown in Figure 4.4-1 at altitudes as low as 100 above ground level (AGL). The flights are expected to occur in groups throughout the day, with about 30 percent occurring at night between the hours of 10 P.M. and 7 A.M. Without the ECTC, it is estimated that in the year 2000 only about 6 military jets per day would pass through the UTTR at several hundred to several thousand feet AGL.

The effects of ECTC operations on WSAs are expected to be significant and adverse. Under requirements established in the Federal Land Policy and Mangement Act (FLPMA) of 1976, and Bureau

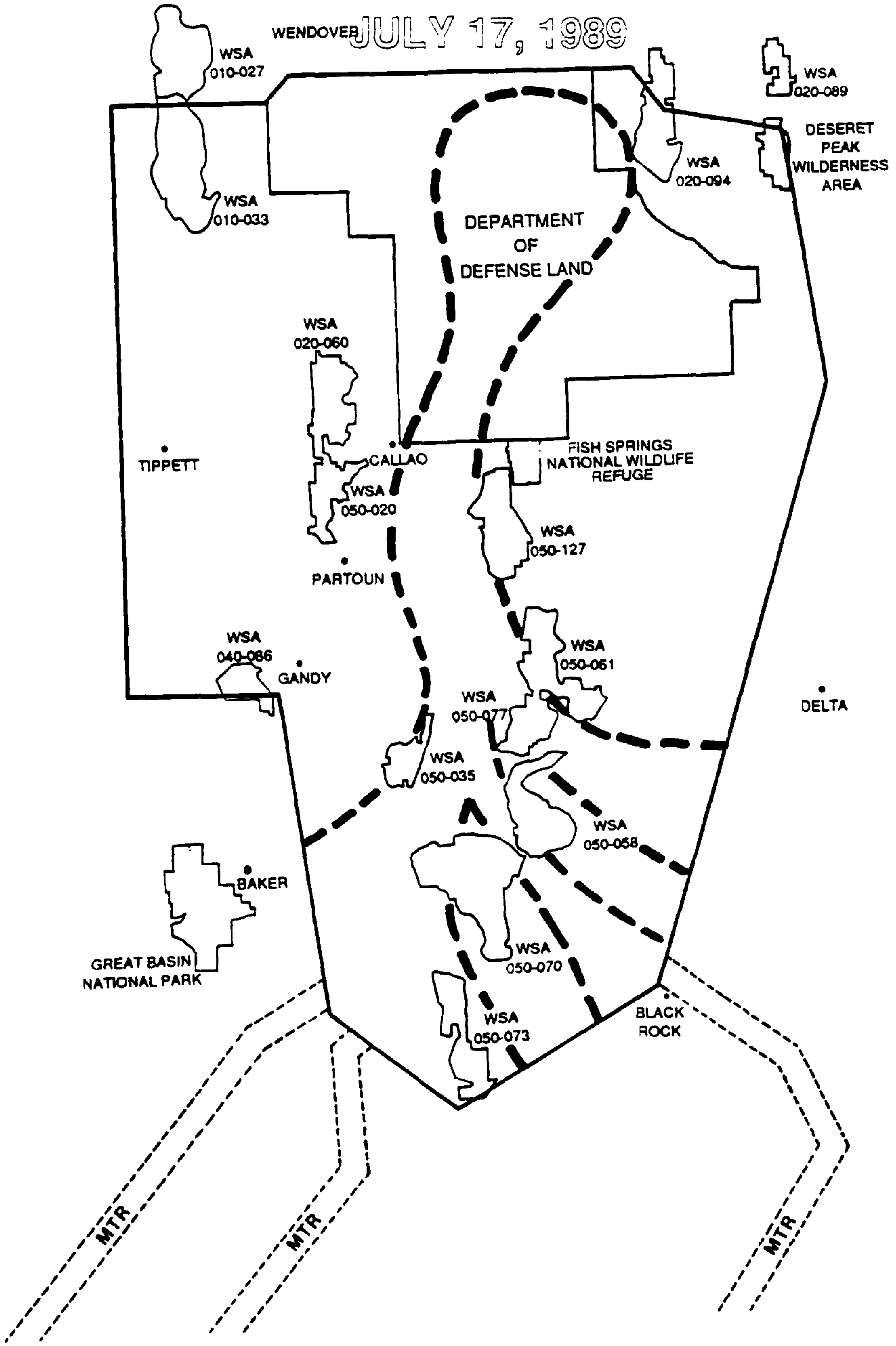

Figure 4.4-1. Likely paths (in percentage of total) of jets using ECTC under the Tule Valley alternative and locations of wilderness study areas.

of Land Management (BLM) regulations developed pursuant to this Act, the ECTC may be incompatible with the BLM's responsibility for management of WSAs.

As described in Section 3.4, the BLM is required to manage WSAs so as not to impair their suitability for preservation as wilderness. The ECTC, however, has the potential to impair the wilderness characteristics of several WSAs and thereby threatens to conflict with the intent of FLPMA.

When the BLM identified WSAs in Utah in 1980 jet noise from UTTR operations was considered "...infrequent and of short duration..." and therefore did not significantly affect the solitude of the WSAs (BLM, 1980). Six years later in its Draft EIS on Utah's Wilderness Program (BLM, 1986), the BLM concluded that military aircraft on the UTTR occasionally fly directly over WSAs, and that these operations detract from, but generally do not eliminate the overall opportunities for solitude. Because of these military operations at the UTTR (as of 1986), as well as other non-military factors, the BLM proposed in 1986 that parts, or all, of several WSAs under UTTR airspace were not suitable for wilderness designation because of a lack of solitude (BLM, 1986).

ECTC operations would be expected to destroy the wilderness characteristics of the remaining WSA acreage on the UTTR. Noise within WSAs caused by ECTC operations would occasionally exceed 120 decibels (dbl) as jets pass at 100 AGL (Section 4.7). Moreover, some jets would be traveling at speeds approaching, and on occasion accidentally exceeding, the sound barrier which could cause very loud sonic booms. Furthermore, operational demands of the ECTC require that jets remain undetected to the extent possible, thereby forcing pilots to fly close to mountain sides. Many of the highest mountain ranges under UTTR airspace are coincident with the most remote regions of the WSAs.

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The Secretary of the Interior (via the BLM) is required by FLPMA to preserve the wilderness characteristics of WSAs so that Congress can decide which WSAs (or parts thereof) to include in the National Wilderness Preservation System. Although the BLM has no jurisdiction over airspace use at the UTTR, the ECTC program threatens to conflict with FLPMA's requirement that the Secretary of the Interior preserve the wilderness characteristics of WSAs until Congress makes its final decisions regarding their appropriate use.

Great Basin National Park

The proposed action will have minor and insignificant noise and visual impacts on Great Basin National Park.

About 90 percent of the jets participating in ECTC exercises will enter Tule Valley along high-altitude, south-to-north travel routes. The jets will drop to a low altitude at the southern end of the military operations area (MOA); fly northward at low altitudes, passing over the various threat sites; and return to staging bases along established high-altitude routes. Hence, 90 percent of the low-level sorties will be limited to the existing MOA, which at its closest point is about six miles from Great Basin National Park.

Visitors to the park may hear an increase in distant jet noise under the proposed action because 20 percent of the ECTC sorties are expected to approach Tule Valley along low-altitude routes from Snake Valley (Figure 4.4-1). These jets could fly as close as six miles from the park boundary. Moreover, people hiking in the park where there are unobstructed views to the northeast could observe jets operating in Snake Valley that are en route to Tule Valley.

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About 10 percent of the sorties participating in ECTC exercises will enter the southern part of the MOA along one of four Military Training Routes (MTRs) (Figure 4.4-1). None of these MTRs pass over Great Basin National Park; hence, noise impacts to the park are not expected from these sorties. Some jets participating in ECTC missions could exit the MOA at high altitudes along a west-bound MTR that passes directly over the park, thereby increasing the number of jets that now fly over the park (Figure 4.4-1). Military jets currently fly along this MTR at elevations ranging from just above the surface to 1,500 ft AGL. A slight increase in military use of this MTR may result from ECTC operations. This increase will result in insignificant effects on the park and park users.

Fish Springs National Wildlife Refuge

The proposed action in Tule Valley will not affect Fish Springs National Wildlife Refuge. The route of ECTC jets will be limited to low-altitude flying in Tule Valley. After the north-bound jets have flown over the TTA sites in Tule Valley, they would continue to travel northward over Department of Defense (DOD) land, rather than cross the Fish Springs Range and fly over the wildlife refuge in northern Whirlwind Valley (Figure 4.4-1).

Deseret Peak Wilderness Area

Deseret Peak Wilderness Area partially lies beneath the MOA illustrated in Figure 4.4-1. ECTC aircraft operating under the proposed action would be flying at high altitude over the Wilderness Area. Thus, the area would not be significantly affected by the ECTC.

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Proposed Pony Express National Historic Trail

The proposed action in Tule Valley will require that ECTC jets fly at a low altitude directly over parts of the proposed Pony Express National Historic Trail. If the trail is designated by Congress, more visitors can be expected to visit the ruins along the trail. Some of these visitors would experience annoyance as a result of low-flying jets. Jet noise could exceed 120 dbl along parts of the trail (Section 4.7). Jets flying over Boyd Station, one of several sites along the trail, could cause structural damage from noise-related vibrations.

4.4.2 ALTERNATIVE VALLEYS

4.4.2.1 Snake Valley

Wilderness Study Areas

WSAs that would be affected by the Snake Valley alternative are indicated on Figure 4.4-2. The significance of impacts to WSAs are similar to those described under the proposed action, except that (1) the amount of affected WSA acreage is smaller than under the proposed action, and (2) the duration of noise in WSAs (number of flights per unit time) is less than for the proposed action because fewer WSAs will be overflown.

Great Basin National Park

Visitors to the park may hear more distant jet noise under this alternative (compared to Tule and Whirlwind valleys) because 70 percent of the low-altitude ECTC flights would originate in Snake Valley, which is closer to the park than either Tule or Whirlwind valley. Moreover, people hiking in the park where there are

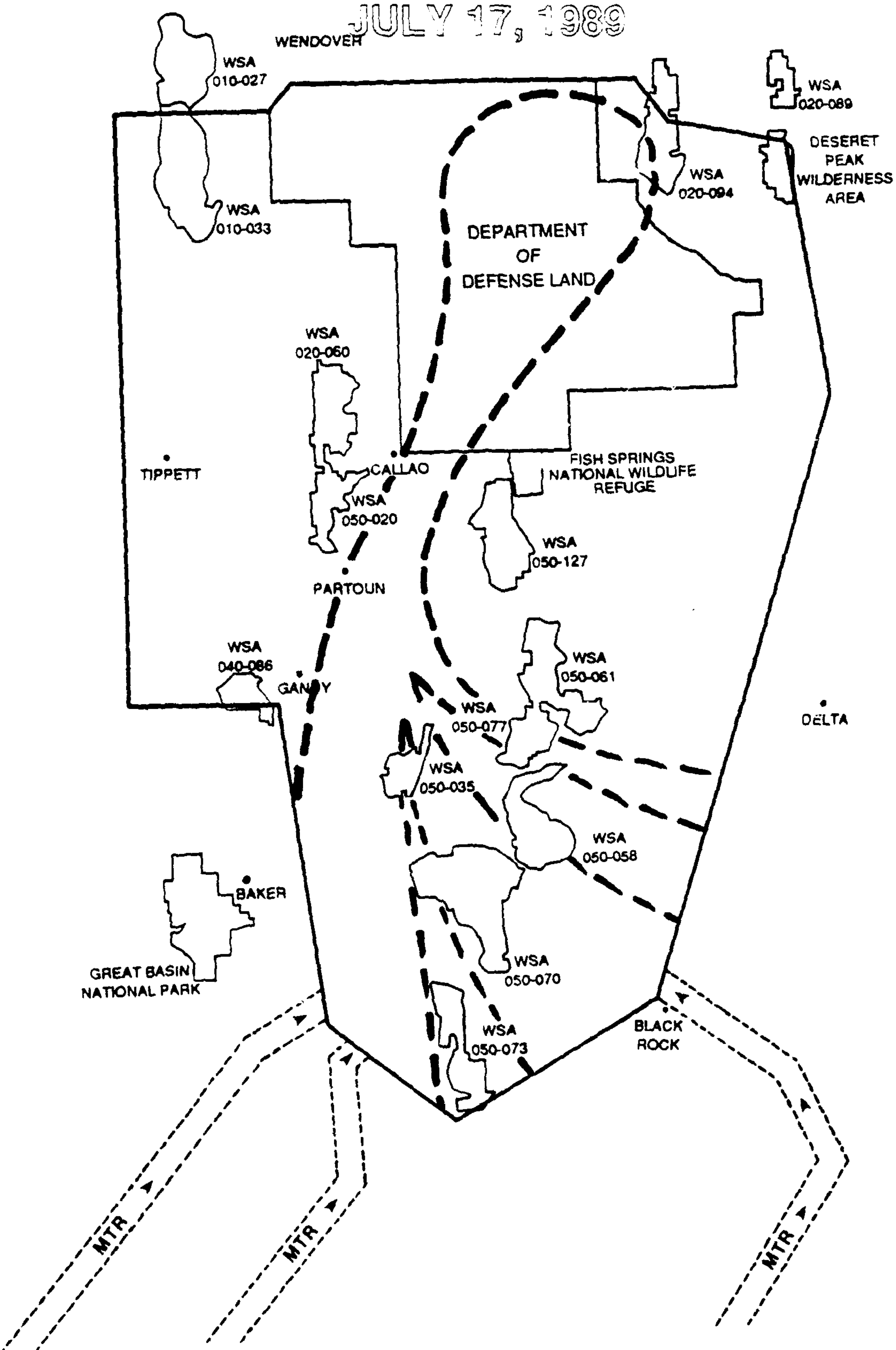

Figure 4.4-2. Likely paths (in percentage of total) of jets using ECTC under the Snake Valley alternative and locations of wilderness study areas.

unobstructed views to the northeast could observe jets operating in Snake Valley. These effects are not expected to be significant because the aircraft would be at least six miles from the park.

Fish Springs National Wildlife Refuge

Impacts are expected to be insignificant and similar to those described for Tule Valley.

Deseret Peak Wilderness Area

Impacts are expected to be insignificant and similar to those described for Tule Valley.

Proposed Pony Express National Historic Trail

Impacts are expected to be insignificant and similar to those described for Tule Valley.

4.4.2.2 Whirlwind Valley

Wilderness Study Areas

WSAs that would be affected by the Whirlwind Valley alternative are indicated in Figure 4.4-3. The significance of impacts to WSAs are similar to those described under the proposed action in Tule Valley, except that (1) the amount of affected WSA acreage is smaller than the proposed action, and (2) the duration of noise effects to WSAs (number of flights per unit time) is less than for the proposed action, but more than for the Snake Valley alternative (compare Figures 4.4-1, 2, and 3).

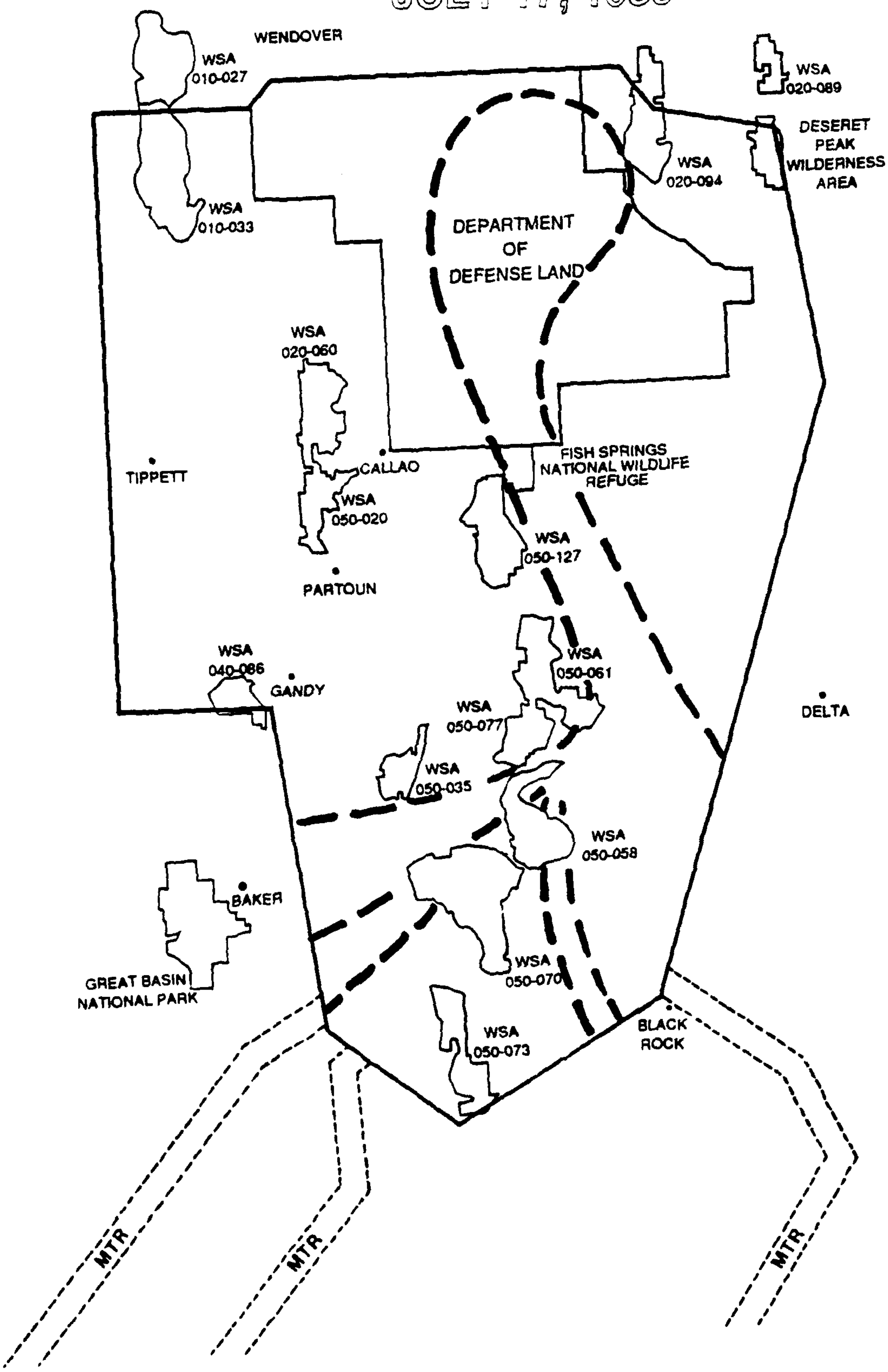

Figure 4.4-3. Likely paths (in percentage of total) of jets using ECTC under the Whirlwind Valley alternative and locations of wilderness study areas.

Great Basin National Park

Visitors to the park may hear distant jet noise under this alternative since approximately 15 percent of the low-altitude ECTC flights operating in Whirlwind Valley would originate in Snake Valley, which is adjacent to the park. People hiking in the park where there are unobstructed views to the east-northeast could observe jets operating in Snake Valley en route to threat sites in Whirlwind Valley. Nevertheless, of the three valleys under consideration, this alternative would have the least effect on Great Basin National Park.

Fish Springs National Wildlife Refuge

Fish Springs National Wildlife Refuge could be significantly impacted under the Whirlwind Valley alternative. After passing over the threat sites in Whirlwind Valley at altitudes as low as 100 ft AGL, jets would veer eastward to avoid the refuge (as shown on Figure 4.4-3). Section 4.3 describes the effects of jet noise on birds throughout the region, including those at the refuge.

The ECTC may be incompatible with the legislation :hat established Fish Springs National Wildlife Refuge. In that legislation (see Section 3.4), Congress intended that the refuge be used "... as an inviolate sanctuary...for migratory birds." Noise impacts from day and night ECTC missions in Whirlwind Valley would conflict with management of the refuge by the USFWS and would therefore represent a sgnificant impact to the refuge.

Deseret Peak Wilderness Area

Impacts are expected to be insignificant and similar to those described for Tule Valley.

Proposed Pony Express National Historic Trail

Impacts are expected to be insignificant and similar to those described for Tule Valley.

4.4.3 PROPOSED AND ALTERNATIVE PRIMARY STAGING BASES

No impacts are expected to unique Federal lands from the proposed and alternative staging bases. Jets taking off from any of these bases for ECTC missions would reach high altitudes (> 5,000 ft) as soon as possible after takeoff to save fuel. ECTC jets approaching the bases would do so from high-altitude routes. Therefore, no further discussion is included in this Environmental Impact Statement (EIS) on the effects of the various staging bases on unique Federal lands.

4.4.4 MITIGATION

No reasonable methods of mitigation exist to avoid impacts to WSAs.

The only possible method of mitigating the impacts to WSAs is to avoid low-altitude overflights of these areas. ECTC tests, however, often require that the jets fly at low altitudes for long distances, often flying next to high mountain ridges to avoid detection. These ridges are generally coincident with the higher elevations of the WSAs. Additionally, pilots require a variety of approach routes to a valley so that they do not become familiar with a single route. When the operational requirements of the ECTC are considered collectively, it is unlikely that measures could be implemented to mitigate the expected impacts to WSAs under the proposed action or alternative valleys.

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4.4.5 UNAVOIDABLE IMPACTS

4.4.5.1 Proposed action in Tule Valley

If the proposed action is implemented, the wilderness characteristics of several WSAs could be significantly altered, thereby affecting suitability of these WSAs for wilderness designation.

Visitors to Great Basin National Park may hear distant jet noise under the proposed action because jets could fly as close as six miles to the park boundary. Jets exiting the ECTC from the south could fly at high altitudes directly over the park. People hiking in the park where there are unobstructed views to the northeast could experience adverse visual impacts caused by flying jets.

Some visitors could be annoyed by ECTC missions when visiting the Pony Express Trail in northern Tule Valley.

4.4.5.2 Alternative valleys

Snake Valley

Unavoidable impacts under the Snake Valley alternative are similar to those described under the proposed action.

Whirlwind Valley

Unavoidable impacts under this alternative are similar to those described under the proposed action, except that significant impacts to Fish Springs National Wildlife Refuge would be expected.

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4.5 CULTURAL RESOURCES: ARCHAEOLOGICAL AND NATIVE AMERICAN

Criteria for evaluating cultural resources for possible inclusion in the National Register of Historic Places are specified at 36 CFR Part 60.4. These criteria and the draft guidelines issued by the Advisory Council on Historic Preservation (ACHP, 1985) for addressing requirements of the American Indian Religious Freedom Act (AIRFA) are the basis for evaluating direct and indirect impacts to cultural resources. Direct impacts result in physical destruction, damage, or alteration of all or part of the cultural resource. Indirect impacts include alteration of the character of the surrounding environment that contributes to the property's cultural significance, introduction of elements into the environment that are out of character with the cultural resource or that alter its setting, and unauthorized collection of artifacts or vandalism.

A Class III cultural resource inventory was conducted by professional archaeologists using pedestrian survey procedures at each of the 13 initial tactical threat area (TTA) sites in each valley and along access roads to these sites (Batterman and Smith, 1989). American Indian representatives from Deep Creek Goshute Reservation, Skull Valley Goshute Reservation, Uintah-Ouray Ute Reservation, and the Southern Paiute Tribes of Utah visited most of the 13 initial TTA sites and range maintenance facility (RMF) sites and provided interpretation of traditional cultural values associated with the sites and valleys (Stoffle et al., 1989). The American Indian tribes involved in the consultation process and the Utah State Historic Preservation Officer have reviewed the archaeological and American Indian technical reports.

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4.5.1 PROPOSED ACTION

American Indian representatives expressed programmatic concerns focusing on the following central issues: loss of traditional land to military use and low-altitude overflights. Goshute representatives at Deep Creek and Skull Valley perceive the granting of rights-of-way to Bureau of Land Management (BLM) administered land to the Air Force as another episode in their continued loss of traditional lands and in their struggle to obtain additional lands for tribal members and for economic development purposes. They stated that they are opposed to the use of additional land for military purposes in their traditional territory.

Goshute leaders and elders expressed strong concerns regarding the effects of low-altitude overflights within reservation boundaries and in the UTTR and ECTC area. They believe that such overflights will increase substantially with development of the ECTC. Low-altitude overflights were attributed with disturbing religious ceremonies; permanently scaring the spirits of the old people, thereby disturbing the dead and angering the spirits; scaring animals from their habitats; and causing cracks in the tribal administration building at Deep Creek. Deep Creek Goshute representatives expressed concern for the newly reintroduced tribal elk herd on Ibapah Mountain, which they believe will be driven away by continued low-altitude overflights. It should be noted that ECTC-related aircraft are not expected to fly over Ibapah Mountain at low altitudes.

4.5.1.1 <u>Impacts in Tule Valley</u>

Development of the ECTC under the proposed action will result in few direct or indirect impacts to archaeological and Native American cultural resources within Tule Valley.

Archaeological

No known archaeological sites are expected to be affected from construction of the 13 initial TTA sites. The Tule Valley RMF is located in the vicinity of the sand dunes near Sand Pass. No archaeological resources were located during the inventory for this RMF. However, cultural resources possibly existing near the sand dunes, which are sensitive areas (see Section 3.5), may experience indirect impacts as a result of unauthorized artifact collection or vandalism.

American Indian

American Indian representatives indicated that the aesthetic value associated with 5 sites and culturally important plants located at one site will be disturbed during construction and operation of the 13 initial TTA sites. The representatives indicated that there may be subsurface features and artifacts associated with sand dunes near the Sand Pass RMF. American Indian values associated with these features may undergo impacts from construction and operation of the RMF.

4.5.1.2 Intermediate threat area sites and range maintenance facility

Archaeological

Construction and operation of the intermediate threat area (ITA) sites located in the Great Salt Lake Desert west of Dugway Proving Ground (DPG) are not likely to result in direct impacts to archaeological resources, since such resources are not likely to be located at or near the sites (see Section 3.5 for discussion of sensitive areas). The maintenance facility for these sites is proposed to be located at Michael Army Airfield (AAF).

Construction and operation of this facility is not likely to result in adverse impacts to archaeological resources, since the physical environment is currently disturbed and in-place resources are not likely to be located at Michael AAF.

American Indian

American Indian representatives did not comment on traditional cultural values associated with potential ITA sites on the maintenance facility at Michael AAF. Given their location in the Great Salt Lake Desert, construction and operation of the ITA sites is not likely to result in impacts to American Indian resources.

4.5.1.3 Strategic threat area arrays and range maintenance facility

The two strategic threat area (STA) arrays are located near each other in the Great Salt Lake Desert. The historic existence of several major Goshute villages proximate to both arrays indicates that cultural resources may be present and may experience direct and indirect impacts from constructing and operating either STA array. Archaeological resources and American Indian values associated with these villages and likely cultural resources would be impacted by construction and operation of the STA arrays as a result of land disturbance and concerns about low-altitude overflights.

The maintenance facility for the STA arrays is proposed to be located at Wendover AAF. Construction of this facility could result in adverse impacts to historic buildings, since the airfield is listed in the National Register of Historic Places.

4.5.1.4 Gapfiller radar site

The location for the gapfiller radar installation is Frisco Peak in the San Francisco Mountains. The site was selected because it is the highest elevation in the mountain range. Mountain peaks are places where American Indian people frequently held, and continue to hold, social, ceremonial, and religious activities. American Indian representatives did not visit Frisco Peak, but expressed concern that traditional cultural and religious values and cultural resources potentially associated with the peak would experience impacts as a result of constructing and operating the gapfiller radar installations. Archaeologists did not visit Frisco Peak; if it is a religious site, archaeological resources would be present and adversely affected by construction of the gapfiller radar site.

4.5.1.5 Staging bases

Alternative staging bases are Hill Air Force Base (AFB), Michael AAF, Salt Lake City International Airport (SLC), airfields at Delta and Fillmore, and Wendover Airfield. With the exception of Wendover Airfield, which is listed on the National Register, the locations are reportedly disturbed by the presence of existing airfields and facilities; therefore, the presence of intact archaeological and American Indian cultural resources is unlikely. Undisturbed areas, especially at Michael AAF, Delta, and Fillmore, may contain surface or subsurface cultural resources that may experience direct and indirect impacts if construction activities were to occur in these areas. Wendover Airfield is listed on the National Register and may experience direct and indirect impacts as a result of alteration of the surrounding environment.

4.5.2 IMPACTS ASSOCIATED WITH THE SNAKE VALLEY ALTERNATIVE

Development of the ECTC in Snake Valley has the potential to result in significantly greater impacts to archaeological and American Indian cultural resources than the impacts associated with the proposed valley. The presence of abundant springs, marsh areas, streams, and sand dunes in the central portion of the valley, which are sensitive areas (see Section 3.5), indicates that cultural resources are likely to be prevalent throughout the valley. American Indian representatives stated that Snake Valley is an important area to Goshute people and may have comprised part of their core traditional territory. Several Goshute villages were historically located in Snake Valley. Construction and operation of the ECTC in Snake Valley would result in adverse impacts on American Indian cultural values associated with their traditional territory.

Although no archaeological resources were located during the archaeological surveys at the TTA sites, American Indian representatives identified four sites as culturally significant because of their proximity to Knoll Spring, and one site as important because of the culturally valued plants. Because of the prevalence of sensitive areas and the existence of historic Native American villages in Snake Valley, the American Indian cultural values associated with the valley (see Section 3.5) will experience significant direct and indirect impacts from constructing and operating the ECTC under the Snake Valley alternative.

The Snake Valley RMF is located in an alkali mud flat area. No archaeological sites were identified during the inventory for the RMF site. Known Native American cultural resources would not experience impacts, although the location is similar to areas where animal drives, broadcast agriculture, and plant-gathering historically occurred.

Locations for all other facilities under this alternative are the same as under the proposed action.

4.5.3 IMPACTS ASSOCIATED WITH THE WHIRLWIND VALLEY ALTERNATIVE

Development of the ECTC in Whirlwind Valley could result in significantly greater impacts to cultural resources than the level of impacts associated with the p... ...ion in Tule Valley. The valley is well known for the presence ... rchaeological sites at Fish Springs Caves Archaeological Dist... ...nd for the many springs and marshes located in the northern h... ... the valley. While the Air Force would avoid these areas dur... ...struction and operation of the ECTC under this alterna... indirect impacts from unauthorized collecting and vandali... these archaeological sites could result. American Indian representatives indicated that the valley is culturally significant because it was traditionally used as a travel route and is known to contain petroglyphs, important plants, and potential burial sites. Cultural resources throughout Whirlwind Valley and American Indian values associated with these resources and the valley as a whole would experience direct and indirect impacts as a result of constructing and operating the ECTC in the southern portion of the valley. Although no known archaeological sites would experience direct impacts from developing the TTA sites, American Indian representatives judged five sites as culturally significant sites that would experience direct impacts.

The original site for the Whirlwind Valley RMF was near a location where Goshute representatives discovered what they interpreted as an important cultural resource linking them to the valley as a whole. This resource consisted of an ancient projectile point and associated artifacts, which they believe provides evidence of their ancestral ties to the area. The area immediately surrounding the RMF site contained a small rock-shelter and numerous flakes, and

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was interpreted by American Indian representatives as a possible camping and food-processing area. American Indian representatives viewed the original Whirlwind Valley RMF location as culturally significant. Although no archaeological resources were identified during the inventory within the site's boundaries, American Indian cultural resources located near this site would have experienced direct impacts under the Whirlwind Valley alternative. In response to these concerns, the Air Force moved the potential site two miles from the original location.

The gapfiller radar site for the Whirlwind alternative is the same as for the proposed action. Neither archaeologists nor American Indians visited the area. American Indian cultural and archaeological concerns associated with this site are described under the proposed action (see Section 4.5.1.4).

4.5.4 MITIGATION

In most instances, mitigative techniques can reduce direct impacts to archaeological and American Indian cultural resources caused by constructing and operating the ECTC. Under the proposed action in Tule Valley, mitigative techniques can reduce direct impacts to very low and potentially insignificant levels. While successful mitigation of direct impacts at specific sites can occur under the alternative valleys also, programmatic and indirect impacts on cultural resources and American Indian cultural values would be significant and could not be mitigated.

These impacts would be primarily to traditional cultural values, and would result from an increase in low-altitude aircraft disturbing the spirits of American Indian ancestors who resided in Snake and Whirlwind valleys, in larger numbers than in Tule Valley.

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Techniques for mitigation of direct impacts on cultural resources consist of the following:

- o Prior to any land-disturbing activities on areas that have not been surveyed previously, an intensive inventory of archaeological and American Indian cultural resources will be compiled for the area to be disturbed and for a buffer zone of reasonable size around the area. Archaeologists and American Indian representatives would compile these inventories by conducting systematic walkovers of the area.

- o Locations judged by archaeologists or American Indian representatives to contain significant cultural resources would be avoided during construction and operation of the ECTC to the extent that avoidance is both practical and feasible.

- o If avoidance of a culturally significant area is not practical and feasible, a data recovery program would be implemented for cultural resource sites that are eligible for the National Register under the criterion that they have yielded or are likely to yield information important to an understanding of prehistory or history. This data recovery program would be developed in consultation with the Utah State Historic Preservation Officer, appropriate Native American representatives, the BLM, and other relevant parties. For cultural resource sites that are eligible for the National Register under other criteria specified in 36 CFR Part 60.4, other mitigative actions would be conducted, such as documenting historic structures prior to their alteration.

- o Cultural resources that are collected under the data recovery program would be scientifically analyzed by

qualified archaeologists for a reasonable length of time mutually agreed on by the Air Force, BLM, Utah State Historic Preservation Officer, and American Indian representatives. After this time, control over the American Indian artifacts could be transferred by the BLM to American Indian tribes with historic ties to the ECTC study area. These artifacts could be curated at an American Indian controlled and operated museum, such as the museum at the Uintah-Ouray Ute Reservation.

- If evidence of prehistoric or historic cultural resource sites is discovered during land-disturbing ECTC activities, all activities within a 50-ft radius could cease for a reasonable length of time. Appropriate Air Force personnel would be immediately notified of the discovery to ensure that the site is properly handled by qualified archaeologists and American Indian representatives.

- If American Indian burials are discovered during land-disturbing or other ECTC activities, all activities within a 50-ft radius could cease for a reasonable length of time to allow for consultation with appropriate American Indian representatives. At the time of discovery, all burials and associated artifacts would be left undisturbed. Appropriate Air Force personnel would be notified immediately and they would notify qualified archaeologists, American Indian representatives of tribes with historic ties to the ECTC study area, and other relevant parties. Disposition of American Indian burials and associated artifacts will be determined on a case-by-case basis, with disposition of American Indian burials to be decided by American Indian representatives of tribes with historic ties to the area.

Indirect impacts to archaeological and American Indian cultural resources are difficult to mitigate. Nevertheless, all construction and operations personnel could be instructed regarding the general presence of cultural resources in the ECTC area, the confidentiality of cultural resource site locations, the sacred importance of American Indian cultural resources, and the legal prohibition surrounding unauthorized collection of archaeological remains.

4.5.5 UNAVOIDABLE IMPACTS TO CULTURAL RESOURCES

Despite mitigation, unavoidable direct and indirect impacts to archaeological and American Indian cultural resources could result from constructing and operating the ECTC. Unavoidable impacts include the following:

- Direct impacts to cultural resources that have escaped detection during intensive inventories of areas to be disturbed and the surrounding buffer zones.

- Indirect impacts to cultural resources caused by ECTC workers during construction and operation phases of the project.

- Indirect impacts to culturally significant but unavoidable areas caused by low-altitude aircraft. These impacts include disruption of religious ceremonies by noise and noise-induced disturbance of the spirits of ancestors buried in the area.

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4.6 AIRSPACE USE

The proposed ECTC operations will be conducted throughout existing UTTR special-use airspace; therefore, any potential impacts these operations may have on civilian access through this airspace will be generally the same regardless of which valley or alternative staging base is selected. Due to the overall configuration of UTTR airspace, this section discusses increased operations and their effects in terms of the whole South Range under the proposed action.

ECTC-related construction will not have any effect on airspace utilization, therefore it will not be discussed in Section 4.6.

4.6.1 PROPOSED ACTION

Effects on Joint Civil-Military Use

Because the density and duration of airspace use would increase with ECTC operations, civil access through restricted airspace would be somewhat more limited than is currently the case. Use would vary, however, depending on the number of missions scheduled throughout each day. Varying levels of ECTC use will provide reasonable opportunities for civil aircraft to obtain clearance through the restricted areas, especially given the small increase in civil aviation projected for this airspace (Section 3.6).

Although UTTR sorties are projected to increase 30 percent by the year 2000 with the ECTC program, a greater proportion of these flights will be flown at night than now occurs. At the present time, less than ten percent of UTTR missions are flown after sunset; however, this proportion is projected to increase to 25 percent of all sorties to meet both ECTC and non-ECTC night-flying requirements. Since it would be difficult to predict how these

flights will be distributed over the night-flying hours, an even distribution based on available data was used to compare present and projected day-night operations. Currently, an average of 58 sorties are flown daily between 7:00 A.M. and 10:00 P.M., and 6 sorties between 10:00 P.M. and 7:00 A.M. Based on year 2000 projections, this distribution would be 105 and 36 average sorties, respectively, for the same day-night time periods. This distribution indicates that a greater increase in military activity will take place during hours less frequently used by civil aviation.

Effects on airspace use will be minimized by the operational altitude of ECTC missions. Approximately 86 percent of the ECTC sorties will be flown at altitudes below 1,000 ft above ground level (AGL). This is well below the 9,500 to 10,500 mean sea level (MSL) altitudes normally used by range control to clear civil aircraft through the restricted areas. However, altitudes at which civilian aviation are cleared for transit may have to be adjusted periodically, depending on the nature of a particular ECTC test.

Increased coordination of airspace use may be possible with the gapfiller radar system proposed as part of the ECTC program. This feature is perhaps one of the more beneficial steps that will be taken to enhance the safe, compatible use of airspace by military, civil, and commercial aircraft. By providing improved low-altitude radar coverage in the southern region of the South Range, air traffic control at Hill Air Force Base (AFB) would be better equipped to follow civil aircraft flights through the Sevier Military Operating Areas (MOAs) and clear aircraft through restricted airspace associated with the UTTR.

4.6.2 ALTERNATIVE PRIMARY STAGING BASES

Regardless of the alternative staging base selected, the overall airspace utilization within the range would remain the same as previously discussed. Military aircraft staging from an alternate location will fly standard arrival and departure routes, which will be structured so as to not conflict with routes commonly used by commercial or general aviation. Likewise, the relatively low number of sorties projected to operate from an alternative staging base is not expected to impact civilian aviation use of that alternative airfield.

4.6.3 MITIGATION

The following mitigating measures would minimize impacts on civilian aviation caused by the ECTC program:

1. Renegotiate existing Letters of Agreement and Memoranda of Understanding to ensure that procedures are in place to allow civil transit of restricted airspace to the greatest extent practical.

2. Initiate a toll-free telephone line to the range scheduling office at Hill AFB to provide civil pilots with a means of obtaining information on availability of airspace.

4.6.4 UNAVOIDABLE IMPACTS

Restricted airspace will be less accessible to civil aviation aircraft. Although it is not quantifiable at this time, the decrease in accessibility is not expected to be significant.

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4.7 NOISE AND SONIC BOOM

4.7.1 PROPOSED ACTION

Of all noise generated by ECTC program activities, aircraft-related noise will be the most noteworthy. The majority of the noise will be associated with takeoffs and landings at the selected staging bases, low-level subsonic travel across the range, and supersonic flight, when required, in the existing SOA. Noise impacts are addressed for three time periods: 1991, initiation of activities; 1993, an intermediate point; and 2000, steady-state operations. For these time frames, day and night (10 P.M. to 7 A.M.) baseline (non-ECTC) flight operations have been estimated as shown in Table 4.7-1. These were then subdivided by location in the South Range and by altitude.

Table 4.7-1.
Baseline Non-ECTC operations data for south Range of UTTR
Source: Hill AFB, 1989

Year	Operation Type	Operation No.	Night Operations %	Night Operations No.	Equivalent[1] Operations
1991	Testing	6,000	1.0	60	6,540
	Training	21,000	10.0	2,100	39,900
	Total	27,000	8.0	2,160	46,440
1993	Testing	5,500	0.3	16	5,648
	Training	22,500	23.0	5,175	69,075
	Total	28,000	18.5	5,191	74,723
2000	Testing	4,500	0.3	13	4,622
	Training	26,000	23.0	5,980	79,820
	Total	30,500	19.6	5,993	84,442

[1] Equivalent Operations = Daytime Ops + 10 x (Nighttime Ops)
(Ten times night operations is used to account for increased human sensitivity to noise, which occurs beween 10 P.M. and 7 A.M.)

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Baseline operations and each ECTC mission were graphically represented for analysis as shown in Figure 4.7-1. Each ECTC mission was then subdivided by aircraft type, speed, and altitude; number of aircraft by type; and percent of night flying.

RANGEMAP and ROUTEMAP were the two models used to conduct the subsonic portion of the modeling effort. ROUTEMAP was also used to model the noise generated along the MTRs associated with ECTC activities.

For the sonic boom analysis, the c-weighted noise levels are typically used (L_{cdn}). The day/night L_{tdn} contours for sonic boom incidents were developed using an upgraded and computerized version (Plotkin, 1984) of an earlier sonic boom assessment model (Galloway, 1983). Information on baseline and ECTC supersonic sortie rates, percentage of nighttime operations, and probable location of the elliptical contours within the SOA comprised the input to the model. The current number of sorties potentially contributing to the baseline sonic boom noise impact in the South Range (15,972 sorties for 1988) was derived from current range usage data (Hill AFB, 1989). These baseline sorties rates were projected to the year 2000, using the data previously shown in Table 4.7-3 to forecast a total increase in potentially supersonic baseline sorties of 12 percent by the year 2000. For ECTC operations, the estimated number of supersonic sorties for the same three key years is estimated to be 36 in 1991, 216 in 1993, and 3,158 in the year 2000. The fraction of baseline nighttime (10:00 P.M. to 7:00 A.M.) supersonic operations was assumed to be 5 percent. It was estimated that one sonic boom would reach the ground for every five supersonic sorties.

To assess noise impact from supersonic and subsonic flight by a single noise descriptor, values of L_{tdn} for sonic boom exposure have

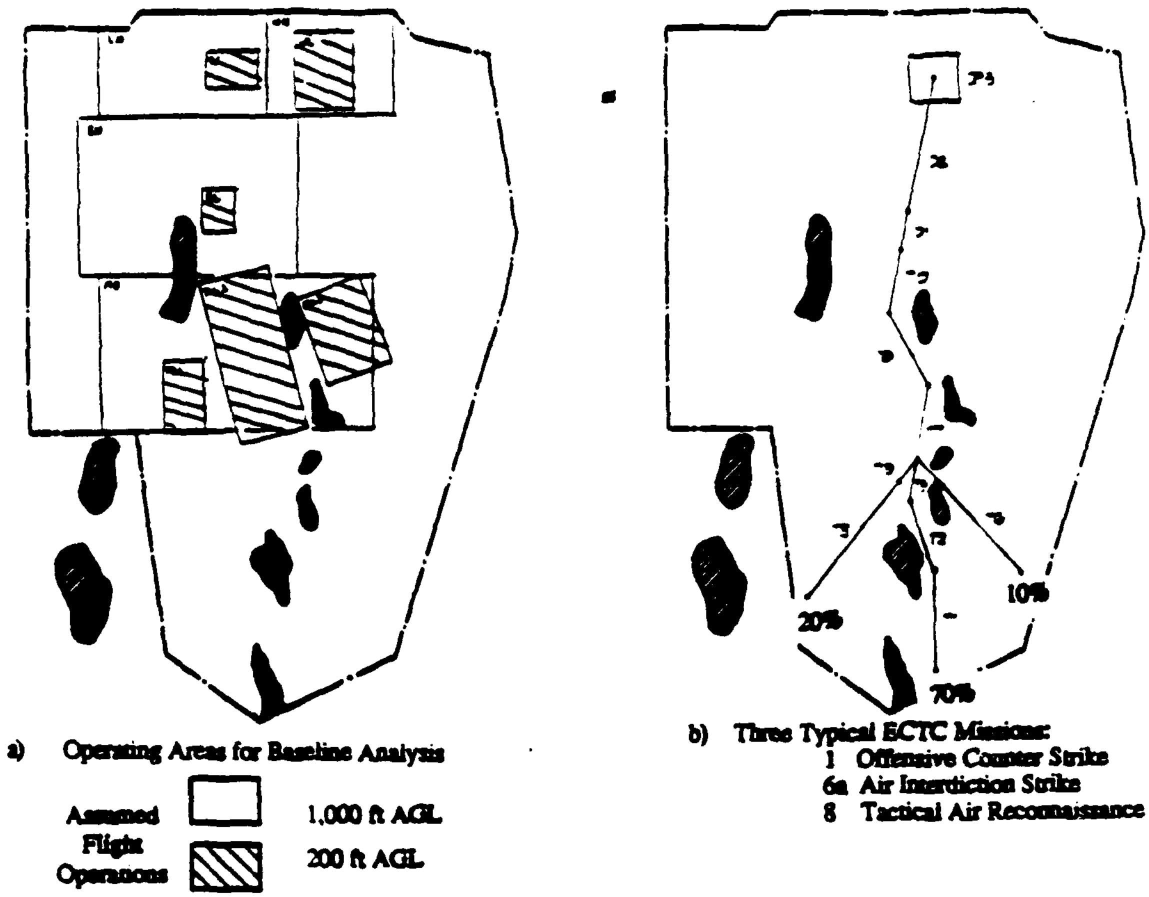

Figure 4.7-1. Nominal centerline of tracks and operating areas assumed for analysis of baseline and three typical ECTC Missions in Tule Valley, year 2000.

been converted to equivalent levels of (A-weighted) L_{dnmr}. L_{dnmr} translates noise levels into the percentage of people that would be "highly annoyed."

Noise due to takeoffs and landings was assessed by using the NOISEMAP program. The program was run, where necessary, to determine future baseline conditions and future baseline conditions plus ECTC operations. Noise associated with other activities was modeled using a fall-off rate of 7.5 dB per doubling of distance.

The criteria adopted by the Air Force for land use compatible with various noise environments (other than sonic boom) are specified in terms of L_{dn} (DOD, 1977), which indicates that any land use should be compatible, without noise mitigation, for L_{dn} values below 65 dB. However, in very quiet, rural areas, it is considered good practice to regard L_{dn} 60 as a practical threshold for potentially incompatible land use. This conservative approach has been employed in the past in some Air Force noise compatibility studies, and was therefore employed for this study.

4.7.1.1 <u>Construction Noise</u>

The principal sources of noise from construction activities are those associated with the operation of heavy equipment such as trucks, earthmovers, concrete mixers, and compressors. For this EIS, the noise generated by such equipment in typical construction operations, based on extensive measurements (EPA, 1971; CFR, 1976a; CFR, 1976b; Barry and Reagan, 1978), was used to estimate day-night average sound levels in the vicinity of typical construction sites; these values were then used to assess the potential noise impact near such sites.

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Table 4.7-2

Distance in Feet from Boundary of Construction Site to L_{dn} Contours for Typical Construction Activity

Road/Runway Operation	L_{dn} 65 dB Contour				L_{dn} 60 Contour			
	Office Bldg		Road		Office Bldc			
	I	II	I	II	I	II	I	II
Ground Clearing	185	185	185	185	293	293	293	293
Excavation	294	117	268	107	466	185	425	170
Foundations	107	107	268	268	170	170	425	425
Erection	244	81	117	107	387	128	185	170
Finishing	294	81	185	185	466	128	293	293

I - All pertinent equipment present at site.
II - Minimum required equipment present at site.

The noise levels predicted by the model assumed that the noisiest piece of construction equipment was located at a distance of 50 ft from the observer. The resulting day-night average sound levels of 65 and 60 dB will occur at the distances from the boundary of the construction site indicated in Table 4.7-2.

Noise from Construction of Range Facilities

Threat Sites

Construction of a threat site is estimated to result in short duration L_{dn} 65 and 60 dB contours with radii of 235 ft and 343 ft, respectively. All threat sites will be at isolated locations, remote from permanent habitations. No impacts are projected.

Range Maintenance Facilities

Based on Table 4.7-2, the temporary noise impact of construction of the RMF at Sand Pass could be approximated by a circle with a radius of about 310 to 650 for the L_{dn} 60 contour and about 270 to 480 ft for the L_{dn} 65 contour, depending on the construction activity. No impacts are predicted.

Construction of the RMF at Wendover field will generate noise that can be defined by contours with radii of about 270 to 610 ft for L_{dn} 60, and 230 to 440 ft for L_{dn} 65, depending on the construction activity. The construction noise within this impact zone would be clearly distinguishable from the baseline airport noise. For construction along the north boundary of the base, residences within no more than one block north of the base boundary would be exposed to the outer (L_{dn} 60) construction noise contour. Since the Western Pacific railroad tracks also border the north side of the base, it is unlikely that the net impact of the temporary construction noise (in this worst-case scenario) would appreciably exceed the existing railroad pass-by noise. This construction noise impact area would exist only during the construction period.

Essentially, the same noise impact would also apply to the construction of RMFs with no resulting impacts in the alternative valleys.

Access Roads

Short-term noise would also be generated during construction or upgrading of access roads to the RMF and threat sites. Boundaries to the L_{dn} 65 and 60 dB contours during construction of the roads would consist of a band extending about 200 and 320 ft, respectively, on each side of the road centerline. This condition would last for only a few weeks. No impacts are predicted.

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Noise from Construction at Staging Bases

Noise Impact - Hill Air Force Base

Construction of ECTC-based facilities would generate estimated noise levels that would result in L_{dn} 60 to 65 contours with radii of about 100 to 300 ft, depending on the type of construction phase (see Table 4.7-2). The impact of such relatively isolated temporary islands of noise, roughly equivalent to the baseline airbase noise environment, is not expected to cause impacts.

Noise Impact - Michael AAF

The L_{dn} 60 and 65 dB contours for the temporary noise impact from ECTC construction at Michael AAF could be approximated by circles with radii of about 310 to 650 ft and 265 to 480 ft, respectively. There are no permanent residences at Michael AAF, so there is no impact from this construction noise on any residential population.

4.7.1.2 Noise and Sonic Boom from Operations

Noise from proposed ECTC operations will be dominated by aircraft noise in the areas of low-altitude aircraft operations in Tule Valley and the northern part of the UTTR South Range. In addition, noise will be generated by take off and landing operations from the staging bases (Hill AFB as primary and Michael AAF as secondary). Operational noise will occur from portable diesel-driven electric power generators during initial operations at the RMF at Sand Pass and at the threat sites until permanent power lines are established. The only other appreciable and identifiable added source of noise from ECTC operations will be from utility

helicopter traffic between an RMF and TTA/STA sites and added road or highway traffic during the commuting of range operations personnel or transportation of mobile range equipment (i.e., threat simulators).

Noise Impact of Operations at Threat Sites - Proposed Action

Threat Sites

In the near term, on-site diesel-powered generators would be used to provide electric power. This source of power will result in a temporary noise increase. Based on an average A-weighted sound level of 78 dBA, the corresponding day-night averaged sound level for continuous operation would be 84.4 dB at 50 ft. The L_{dn} 65 and 60 dB contours will be at distances of 299 and 474 ft from the generator, respectively. The one residence within these contours may be slightly impacted.

Range Maintenance Facilities

Noise impact at range maintenance facilities will occur primarily from operation of mobile diesel-electric power generators. Eventually commercial power will be provided. The A-weighted sound levels at a distance of 50 ft from such electric generators have a range of 71 to 82 dB, with a typical value of 78 dB (EPA, 1971). Assuming that the upper limit is appropriate for the generators and that they will operate continuously, the corresponding day-night averaged sound level (L_{dn}) will be 93.4 dB at 50 ft. The 65 and 60 dB L_{dn} contours will be at distances of 684 and 1,084 ft from the generator, respectively. There are no residences within this area and no impacts are predicted.

The other source of noise during operation of the range maintenance facilities will be the occasional arrival and departure of helicopters. The frequency of helicopter traffic is expected to

grow from current baseline values of about 250 per year (total) to about 750 per year with an ECTC program. Of the added 500 maintenance helicopter trips for ECTC, approximately 30 percent (150 per year) would be to and from the STA sites and the remaining 70 percent (350 per year or approximately one per day) to and from the TTA sites.

For one landing operation per day, the L_{dn} value at 200 ft from a helicopter landing pad would be 43.6 dB. For cruise operations at a speed of 130 kts at an elevation of 400 ft, the L_{dn} directly under the flight track for one overflight per day would be 41.1 dB. These levels are well below 55 dB, indicating that neither baseline nor ECTC-induced helicopter activity presents a noise impact for people or for building structures.

Traffic

Automobile and truck traffic on certain roads in the UTTR can be expected to increase both during construction and operation of the range. The projected increase in traffic volume on most local highways should not increase the current day-night average sound level L_{dn} by more than one or two decibels. A doubling of the traffic volume on any given roadway would be required to increase the present L_{dn} by as much as three decibels. A greater increase in noise levels can be expected in regions that are currently free of traffic, such as in remote areas where gravel access roads are to be constructed. Based on the highway traffic noise model developed by the U.S. Department of Transportation (Barry and Reagan, 1978), typical L_{dn} values at 100 and 1,000 ft from a road carrying 10 heavy trucks per hour in the daytime (7:00 A.M. to 10:00 P.M.) and one truck per hour at night (10:00 to 7:00 A.M.), all at an average speed of 40 miles per hour, would be 55 and 40 dB, respectively. Doubling the traffic volume increases noise levels by 3 dB.

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In remote areas the average day-night sound levels will be on the order of 35 to 45 dB, so that the traffic noise may produce changes in ambient noise levels greater than 3 dB within distances of about ±1,000 ft from the road. Any residence approximately 200 to 300 ft from these roads may be slightly impacted.

Flight Operations

The overall noise impact from subsonic and supersonic flight operations is portrayed by contours of L_{dnmr} at levels of 55, 60, 70, and 80 dB, which are plotted in Figures 4.7-2 and 4.7-3 for the baseline, and in Figures 4.7-4 and 4.7-5 for the baseline plus ECTC operations, for the years 1991 and 2000. The lowest L_{dnmr} contour value plotted (L_{dnmr} 55) is shown only to indicate the maximum extent of the noise impact according to the most conservative criteria for effects on health and safety. The L_{dnmr} 60 dB contour represents a conservative lower limit relative to incompatible land use. The highest contour level plotted (L_{dnmr} 80 dB) is shown to indicate the maximum intensity of the impact. Note that in all cases, the largest contour in any group is the L_{dnmr} 55 dB contour, and the smallest contour is labeled as 60, 70, or 80 dB, depending on the location. The contours in Figures 4.7-2 and 4.7-3 for the baseline subsonic operations in the UTTR are applicable for all of the valley alternatives. Not shown in Figure 4.7-2 are the locations of the existing MTR routes that cross the South Range of the UTTR. The annual operations on these MTRs are so low that maximum L_{dnmr} values directly under the route centerline are less than 60 dB, thus no noise contours are shown.

Areas within each of the composite contour levels equal to or above L_{dnmr} 60 dB are given in Table 4.7-3 for 1991, 1993, and 2000. Three

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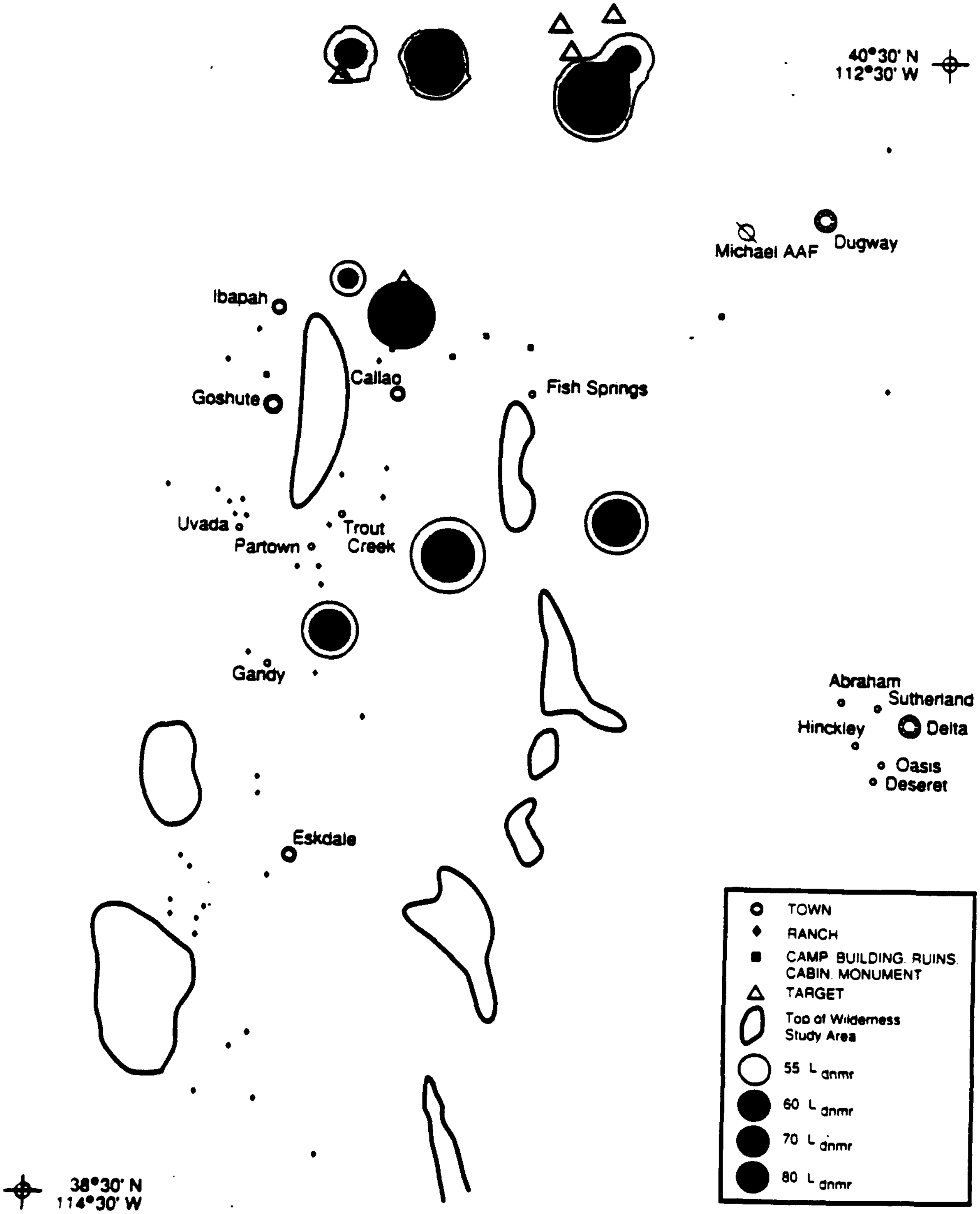

Figure 4.7-2. 1991 noise contours for baseline subsonic operations.

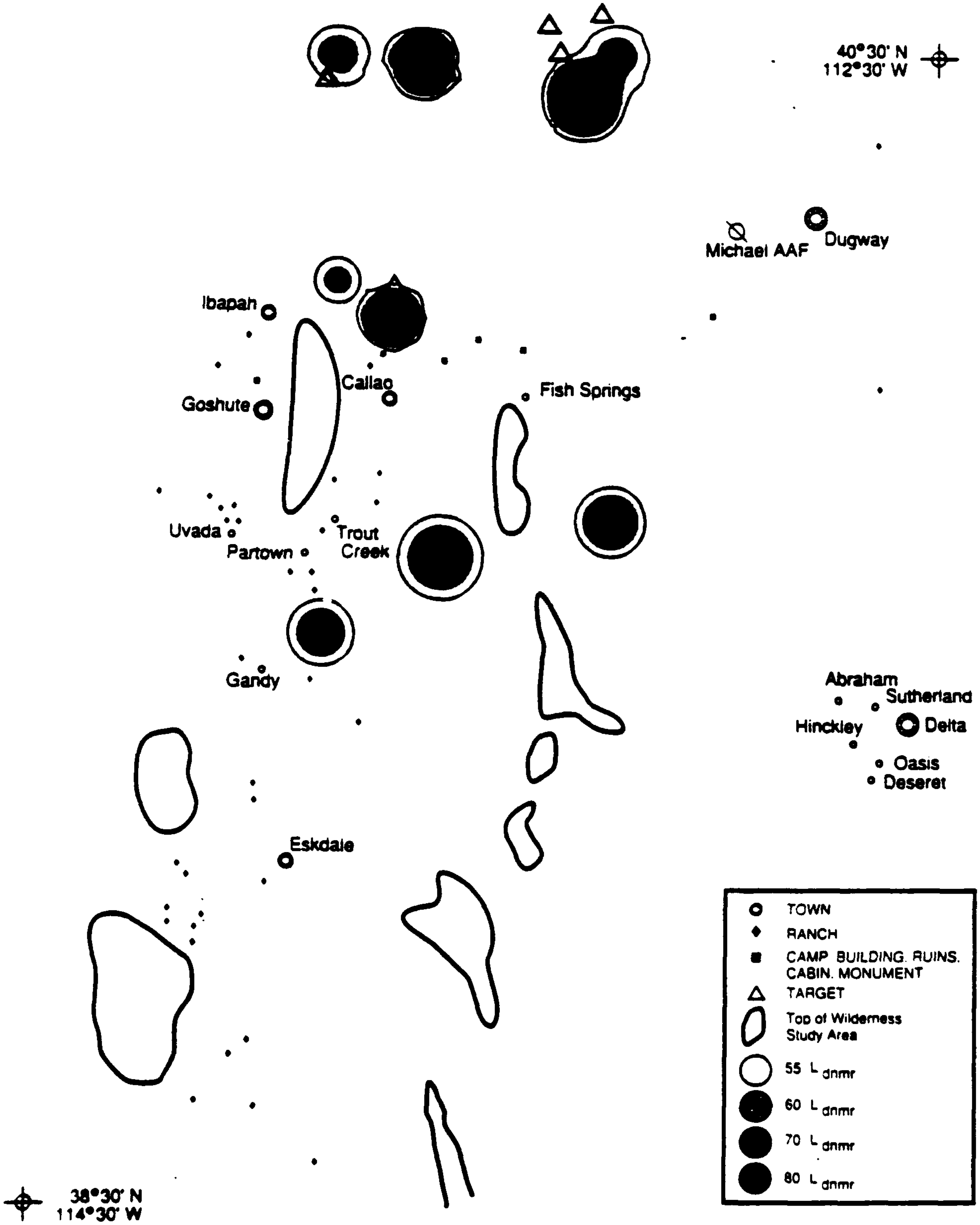

Figure 4.7-3. 2000 noise contours for baseline subsonic operations.

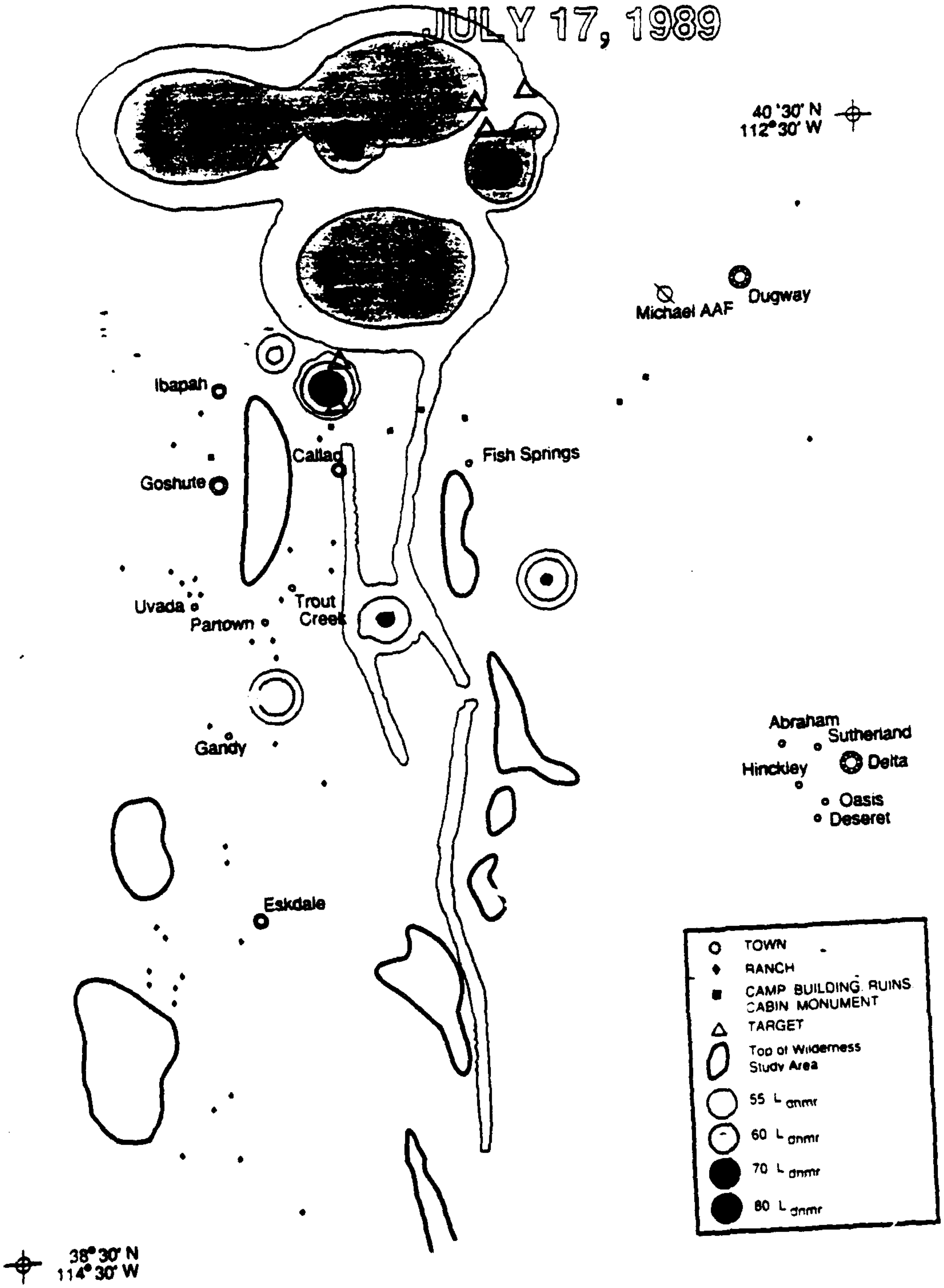

Figure 4.7-4. 1991 noise contours for baseline plus ECTC operations in Tule Valley.

cross-section profiles through the contours in Figure 4.7-5 are shown in Figure 4.7-6 at the three positions A-A, B-B, and C-C, indicated in Figure 4.7-5. These profiles illustrate more clearly the change in noise level above background with distance across the ECTC flight paths.

Table 4.7-3

Areas in Square Miles Within Composite L_{dnmr} Contours for Baseline and ECTC Operations - Proposed Action (Tule Valley)

L_{dnmr} dB	1991 Baseline	1991 +ECTC	1993 Baseline	1993 +ECTC	2000 Baseline	2000 +ECTC
60	226	978	288	1562	303	2354
70	55	57	84	111	84	852
80	7	7	9	9	11	88

Estimates of population in areas with known or estimated habitation were developed from current U.S. Geodetic 7.5 min. survey maps, available census data, and contacts with Utah Highway Patrol and Chamber of Commerce personnel in local areas. The resulting estimates of population, corresponding values of L_{dnmr}, and estimated numbers of people who would be "highly annoyed" by the overall noise exposure are listed in Table 4.7-4 for the three study years for the proposed action, 1991, 1993, and 2000. In the worst-case year 2000, approximately one-fourth of the residents of Callao will be highly annoyed.

Maximum single event aircraft flyover noise levels, which could have significance from the standpoint of effects on people, animals, and structures, will vary widely within the South Range of the UTTR as a result of existing and projected baseline operations. Figure 4.7-7 illustrates the range of possible single

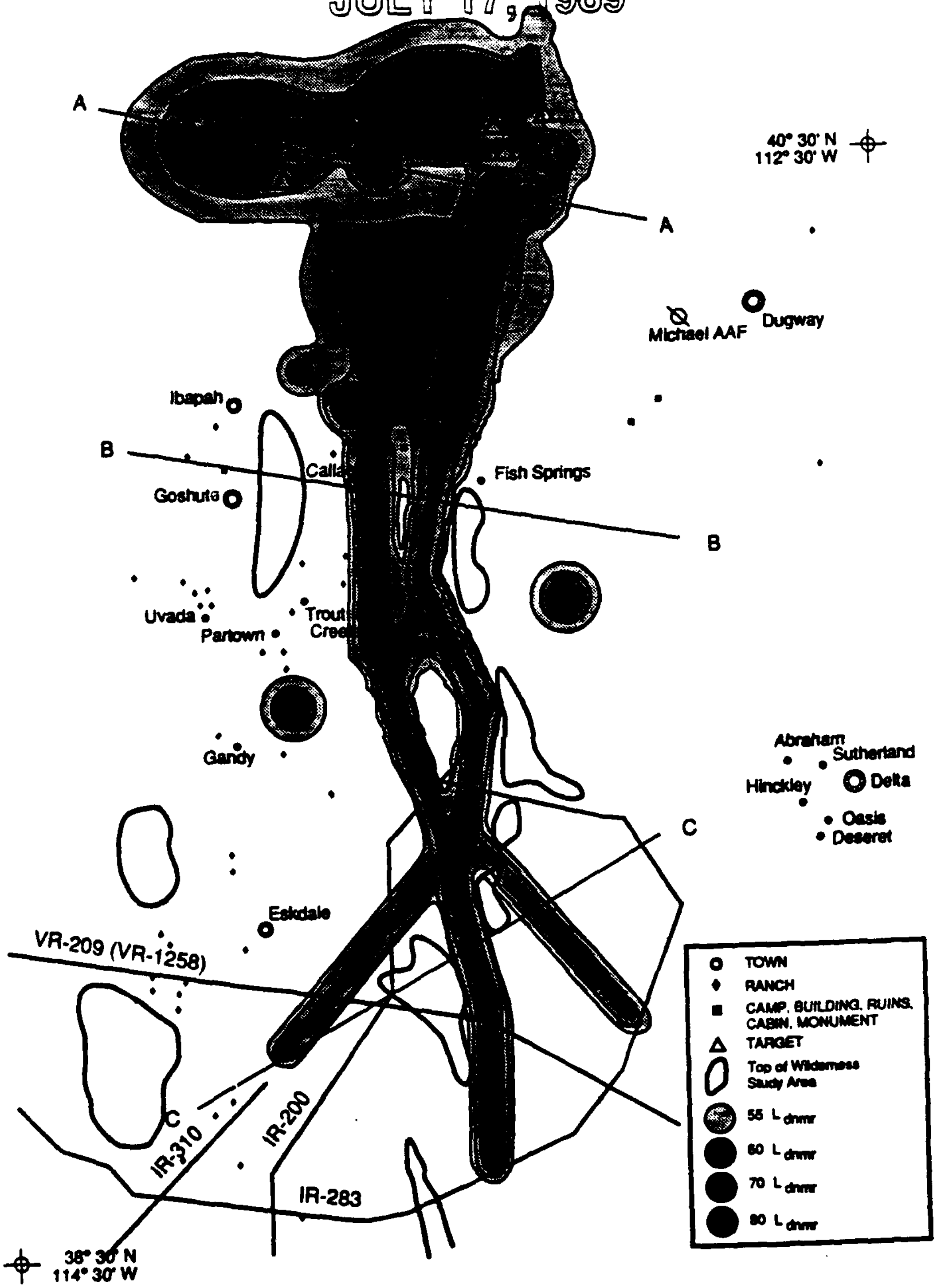

Figure 4.7-5. 2000 noise contours for baseline plus ECTC operations in Tule Valley.

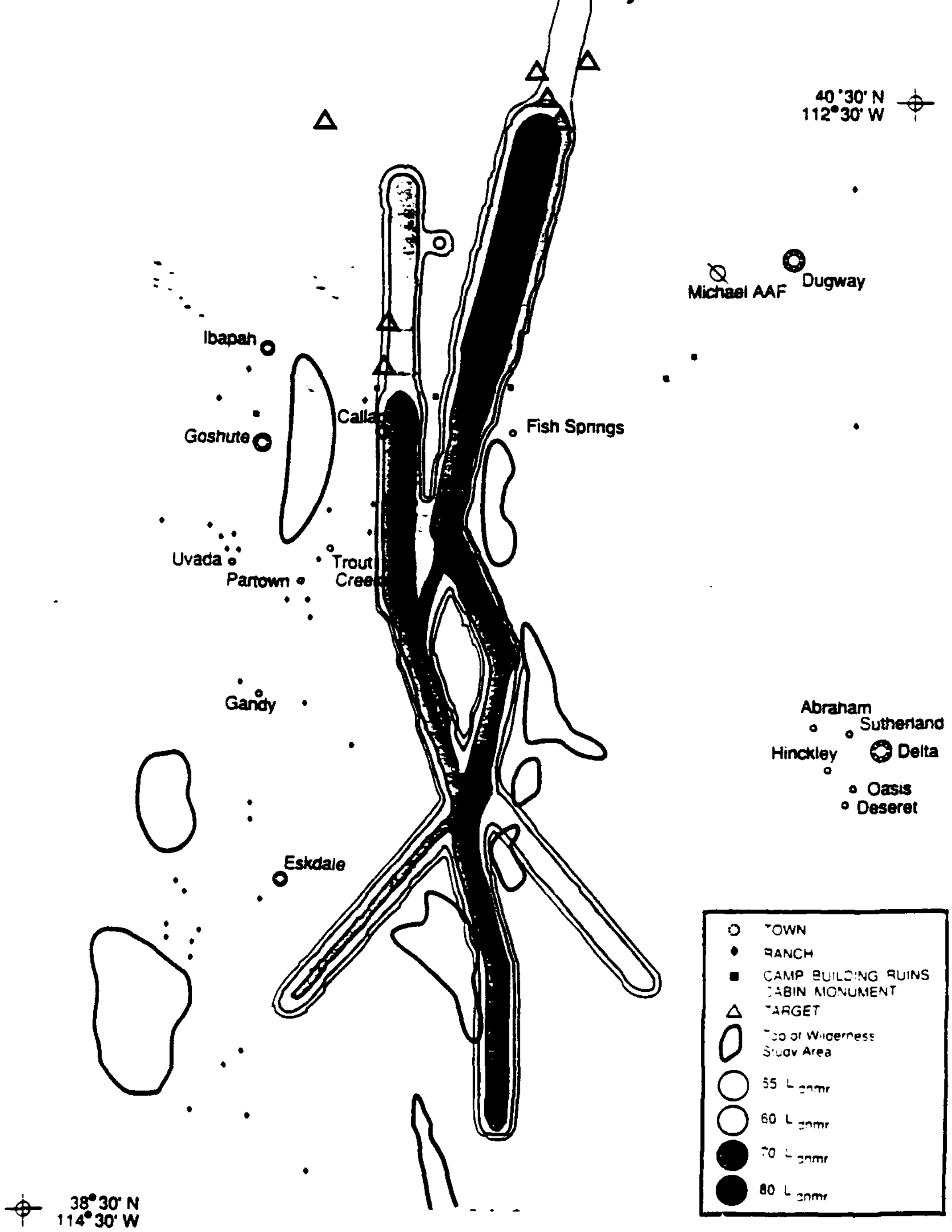

Figure 4.7-5. 2000 noise contours for baseline plus ECTC operations in Tule Valley (Continued)

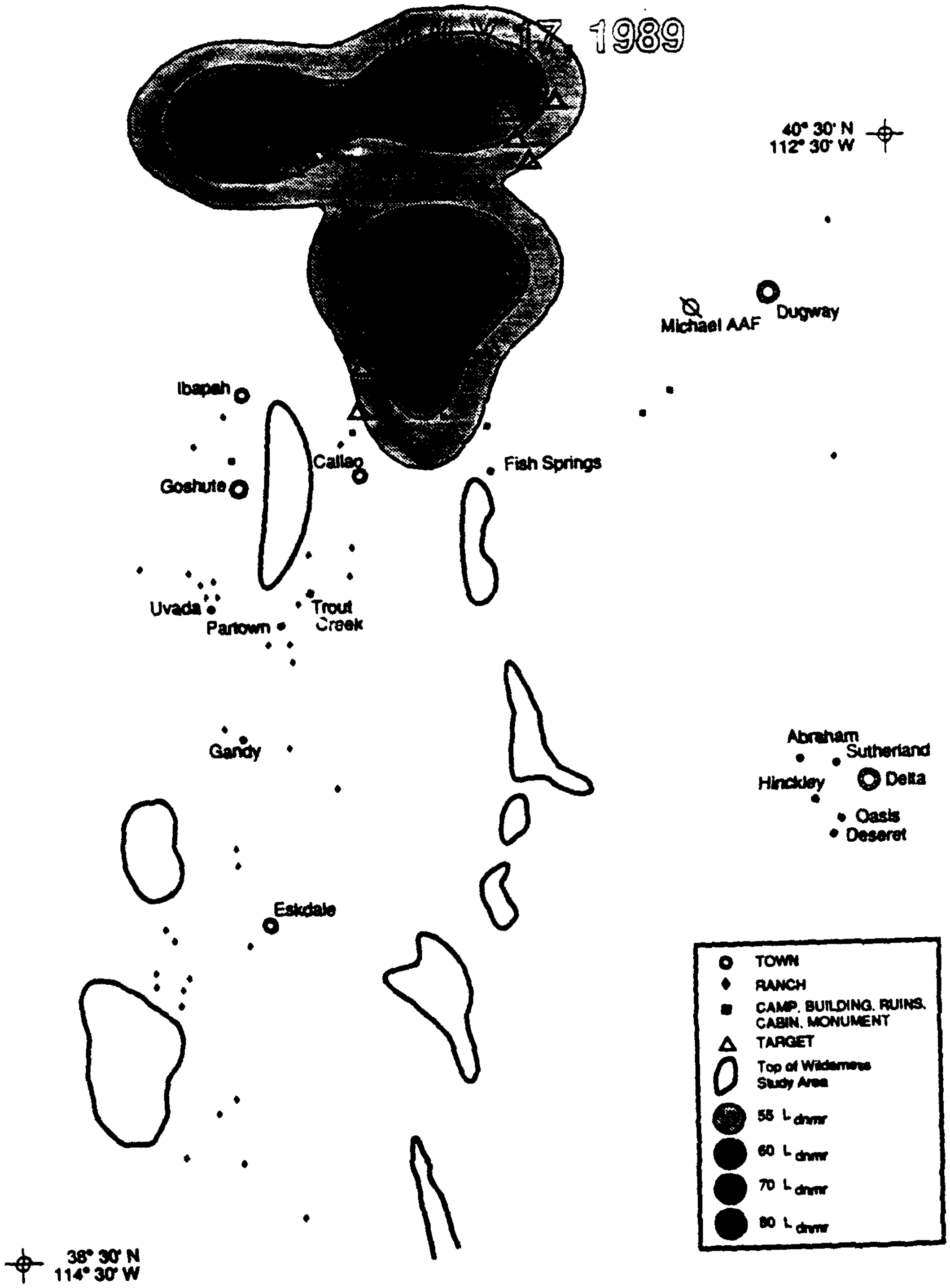

Figure 4.7-5. 2000 noise contours for baseline plus ECTC operations in Tule Valley (Continued)

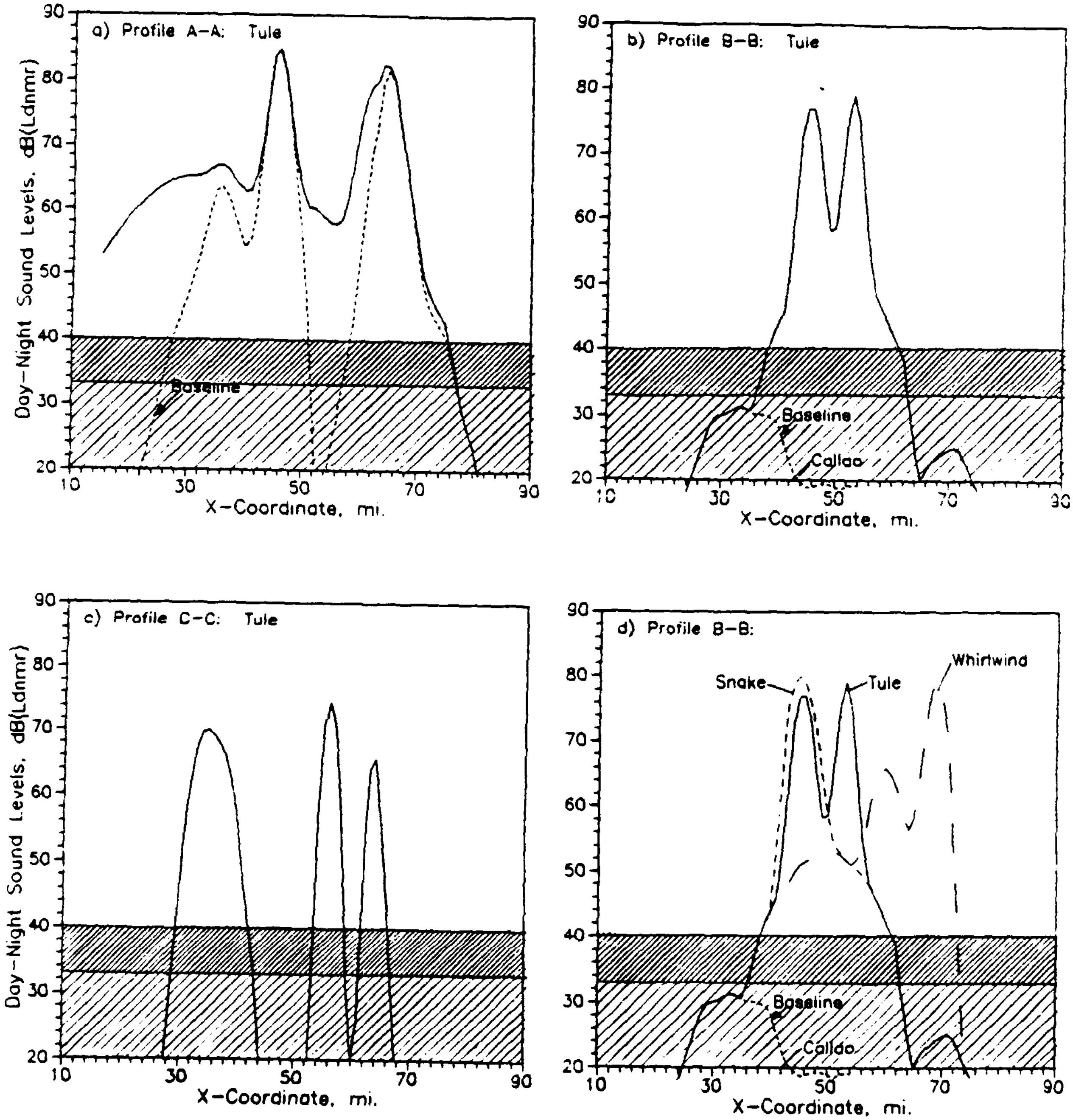

Figure 4.7-6. Profiles of day-night average A-weighted sound level, L_{dnmr}, at three cross sections identified in Figure 4.7-5.

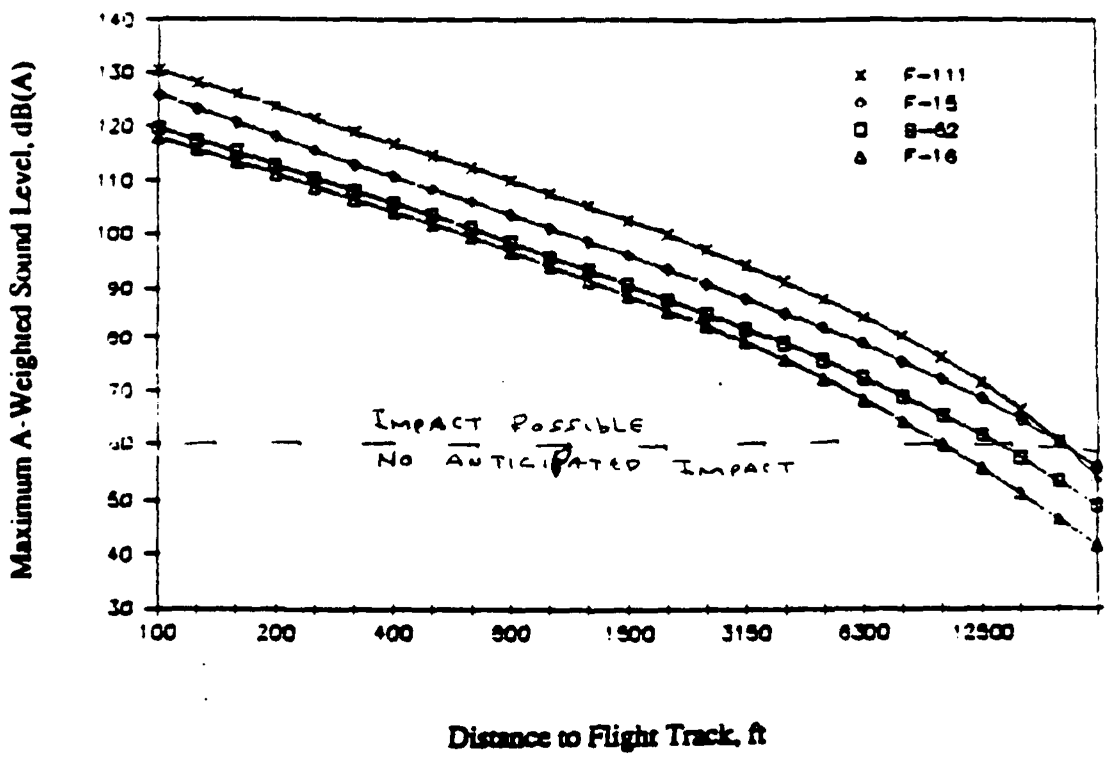

Figure 4.7-7. Maximum A-Weighted Sound Levels as a Function of Distance to that Track for Typical Military Aircraft Involved in Low-Altitude, High-Speed Flight Activity data from Air Force NOISEFILE, Version 5.1 Portion of NOISEMAP Program.)

event sound levels in terms of maximum A-weighted sound levels that can be experienced at various distances from the flight track of typical low-altitude, high-speed aircraft that currently operate in the UTTR.

The number of people impacted (i.e., highly annoyed) by proposed subsonic ECTC operations is small (about 7 people, mostly in the town of Callao) and represents only 0.4 percent of the total estimated population within the UTTR. For these few people, the cumulative impact as measured by the L_{dnmr} noise descriptor would range from slight (L_{dnmr} ~ 60 dB) to substantial (L_{dnmr} ~ 70 dB). The school in Callao would be exposed to an L_{dnmr} of 70 dB for the proposed action.

Residents of the town of Callao, other ranchers, recreationists, and agricultural or mining workers who could be located within the areas overflown by low-altitude, high-speed aircraft may experience some form of startle response or, if at night, may be awakened from sleep as a result of individual overflights. These response patterns are not expected to reduce significantly over time as a result of adaptation because of the sporadic nature of the overflights. By the year 2000, the number of overflights within about 10 miles of the most exposed population center (i.e. the town of Callao) could average about 57 per week, with about 22 percent at night. However, most of these overflights near Callao are expected to lie more than one mile east or north of the town. For overflights this far to one side of the town, single event noise levels will normally be less than those generated by a truck passing at 50 to 100 ft distance, and would not be expected to cause a startle response.

Single event aircraft flyover noise levels will reach maximum values of about 126 dBA at the Boyd's Station Pony Express ruins, located about 10 miles west of the southwest corner of Fish Springs National Wildlife Refuge. Single event levels of this magnitude

can generate readily detectable vibration of structural surfaces and may cause some minor damage to already weakened structures after a long period of repeated exposure.

Existing supersonic flight activity in the South Range and the additional proposed supersonic flight activity anticipated for ECTC is restricted to the Supersonic Operating Area (SOA) at altitudes above 5,000 ft, and the sonic booms resulting from this activity are not expected to impact any inhabited areas. However, recreationists or transient workers who may be temporarily located within the anticipated sonic boom impact areas may experience startle or awakening responses similar to those outlined previously for low-altitude subsonic overflights.

Inadvertent sonic booms may occur infrequently in inhabited areas due to unplanned maneuvers of fighter aircraft operating outside the SOA at subsonic speeds close to Mach 1 (i.e., Mach 0.9 to less than 1.0). Such sonic booms can generate overpressures (pressure wave) that would normally fall in the range of 1 to 4 pounds per square foot (psf), depending on the type of aircraft, the type of subsonic maneuver, and the altitude of the aircraft. Sonic booms of this magnitude can cause minor damage to old buildings in the form of window glass breakage, plaster cracking, etc. However, the probability of this damage is low, as indicated by the following estimated probability of window breakage for sonic booms (Hill AFB, 1985):

Table 4.7-4. Sonic boom overpressure (psf)

Sonic Boom Overpressure (psf)	Probability of Glass Breakage: Random Incidence	Probability of Glass Breakage: Frontal Incidence
1.0	less than 1 percent	less than 1 percent
2.0	less than 1 percent	less than 1 percent
4.0	less than 1 percent	1 percent

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National Supersonic Operations

There is no current requirement for supersonic air operations in connection with the proposed ECTC at the UTTR. The proposed ECTC will utilize existing SOAs and operate within currently established operational limitations for these SOAs. However, the Air Force is not foreclosing the possibility of conducting ECTC-related supersonic operations subsequent to required additional environmental analysis in areas other than presently designated SOAs if future requirements so dictate. A general description of the potential physical and environmental consequences of supersonic operations has consequently been included in this EIS as an indication of the range of effects that could be encountered if additional supersonic airspace were required in the future. Any such action would be preceded by the level of environmental analysis appropriate at that time.

As stated in Chapter 2, this EIS addresses generic impacts from supersonic flights across the South Range. That discussion is included below to inform the public and Air Force decision-makers of the possible impacts of such operations, even though there is no demonstrated need for such supersonic activity at this time. Since this is a generic discussion, it is applicable to all valley alternatives.

Unlike supersonic operations in the SOA, which are associated with Air Combat Maneuvers (ACM) and are transient in nature, these exercises would be expected to involve sustained supersonic flight at constant speed and altitudes. A typical sonic boom footprint,in terms of a contour of peak overpressure in lb/ft^2, is shown in Figure 4.7-8 for an F-15 at Mach 1.4 at 5,000 ft. The maximum

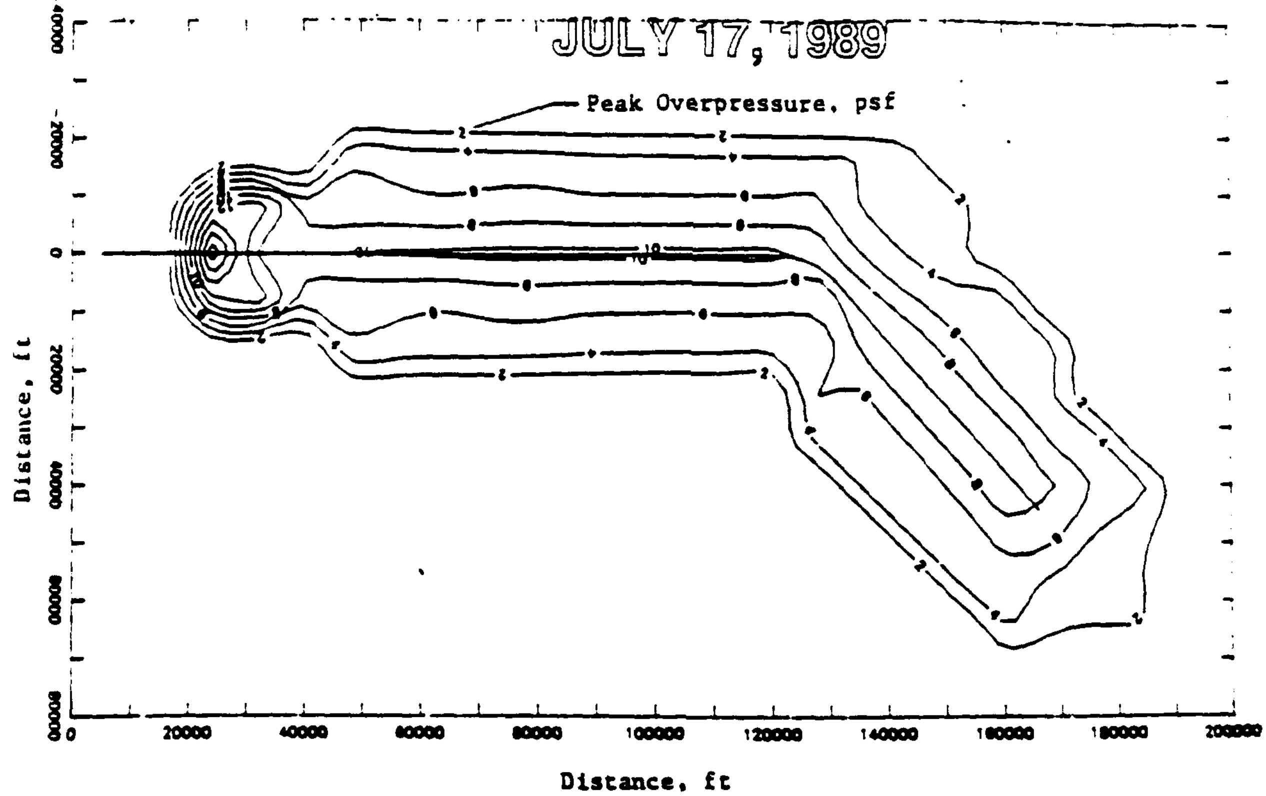

Figure 4.7-8. Sonic boom footprint for F-15 at 5,000 ft AGL Mach 1.4.

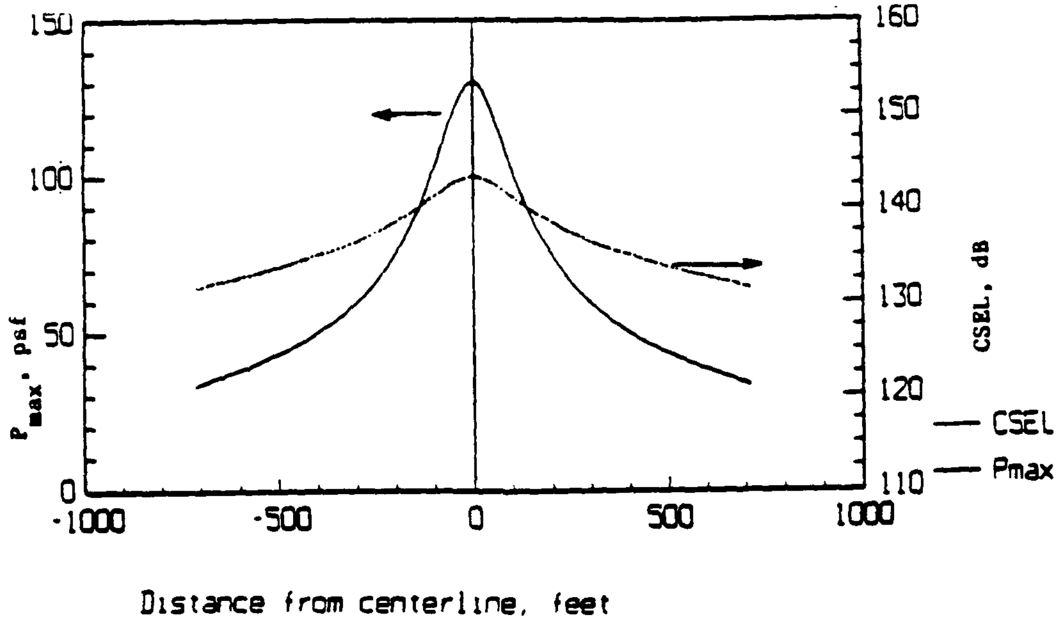

Figure 4.7-9. Cross section of sonic boom footprint for F-111 at 100 ft AGL steady level flight at Mach 1.05.

overpressure of 10 psf, directly under the track, is at the threshold of structural damage criteria and is 5 to 10 times greater than normally experienced under SOAs. For an F-111 at Mach 1.05 at 100 ft AGL, the peak overpressure reaches 130 psf and the 2 psf contour extends 20,000 ft (3.8 miles) on each side of the track. Figure 4.7-9 shows a cross-section, in terms of peak overpressure and C-weighted sound exposure level.

Table 4.7-5 gives the characteristics of the sonic boom footprint for all straight and level operations of the F-111 and for operations of the F-15 up to maximum Mach numbers from 5,000 to 30,000 ft AGL. Listed for each operation are the boom overpressure at the center of the footprint and at the edge, the footprint width, and the "forward projection" of the boom generated as the sonic boom propagates forward of the aircraft in a cone and, eventually, impinges the ground some distance ahead of the generation point.

With regard to effects on humans, the expected community response to high-energy impulsive sounds (CHABA, 1981) would predict that single occurrence of a sonic boom of magnitude of about 130 psf during daytime hours would induce a "highly annoyed" reaction by more than 95 percent of exposed people. Near the lower end (1.6 psf), only about seven percent of the exposed population would be highly annoyed at one occurrence per day. Whether high-intensity booms may cause severe physiological reactions due, for example, to cardiovascular responses is presently unknown. The only documented experimental study of human response to intense sonic booms (Nixon et. al., 1968), showed no physiological damage to observers exposed to sonic booms up to 144 psf. However, the

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Table 4.7-5
Sonic Boom Characteristics

Aircraft	Altitude, (1,000 ft AGL)	Mach Number	P_{max},psf* Center	Edge	Footprint Width (1000 ft)	Forward Projection (1000 ft)
F-111	0.1	1.05	129.7	33.3	1.4	0.3
	0.5	1.05	44.0	10.5	7.2	1.6
	1.0	1.05	30.0	6.8	12.9	3.1
F-15	5	1.05	7.2	6.1	7.4	17.5
	5	1.4	9.2	4.0	29.2	5.2
	10	1.1	4.3	3.3	21.7	24.7
	10	1.5	5.4	2.5	52.1	9.3
	15	1.1	3.1	2.6	22.1	40.6
	15	1.7	4.0	1.8	75.4	11.4
	20	1.15	2.4	1.9	37.2	43.1
	20	1.85	3.1	1.5	97.2	13.6
	25	1.15	1.9	1.8	31.5	58.8
	25	2.0	2.5	1.2	117.0	15.5
	30	1.2	1.6	1.4	46.7	59.5
	30	2.0	2.0	1.0	129.2	19.0

P_{max} values will be up to 2 to 5 times greater for the F-15 and up to 50 percent greater for the F-111 due to maneuvers and accelerations.

observers expected the boom and exhibited a non-habituating tenseness just prior to the exposure -- a level of reaction that cannot be related to simply "highly annoyed." There is a possibility of harmful physiological responses from repeated exposure to such intense sonic booms i.e., those at the higher end of the psf range given in Table 4.7-5.

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A recent literature review (Kull and Fisher, 1986) on effects on animals indicated that (1) avian species (turkeys, chickens, and pheasant) reacted much more to sonic booms than did other farm animals (cows and horses); (2) for sonic booms of less than 5 psf, there was little effect other than some startle reactions; (3) for sonic boom overpressures in the range of 50 to 118 psf, responses by cattle were either unrecognizable or were an apparent altering response; and (4) one classic case of massive hatching failure of a species of terns was attributed, without proof, to intense sonic booms.

Effects of sonic boom on structures have been fairly extensively studied, especially for the purpose of developing a damage potential model. Wiggins (1969) attempted to develop such a model for window damage by combining claims damage data with window damage data available from other sources, including results from one NASA low-altitude sonic boom test in Nevada of specially constructed window specimens (Maglieri et al., 1966) and an FAA test in the White Sands Missile Range (Blume, 1965). With these results, plus data from an accidental explosion and other overflight data, Wiggins developed the statistical prediction model for glass damage illustrated in Figure 4.7-10.

If the Wiggins model is realistic for window breakage, then sonic booms on the order of 50 psf would be expected to break 25 percent of exposed windows; at 100 psf, the probability would increase to about 70 percent of exposed windows. Window breakage at higher sonic boom levels, up to 150 psf, would probably approach 100 percent and would be expected to coincide with other forms of damage to secondary structures, such as plaster cracking, roof or ceiling damage, etc. These estimates for window damage fall within

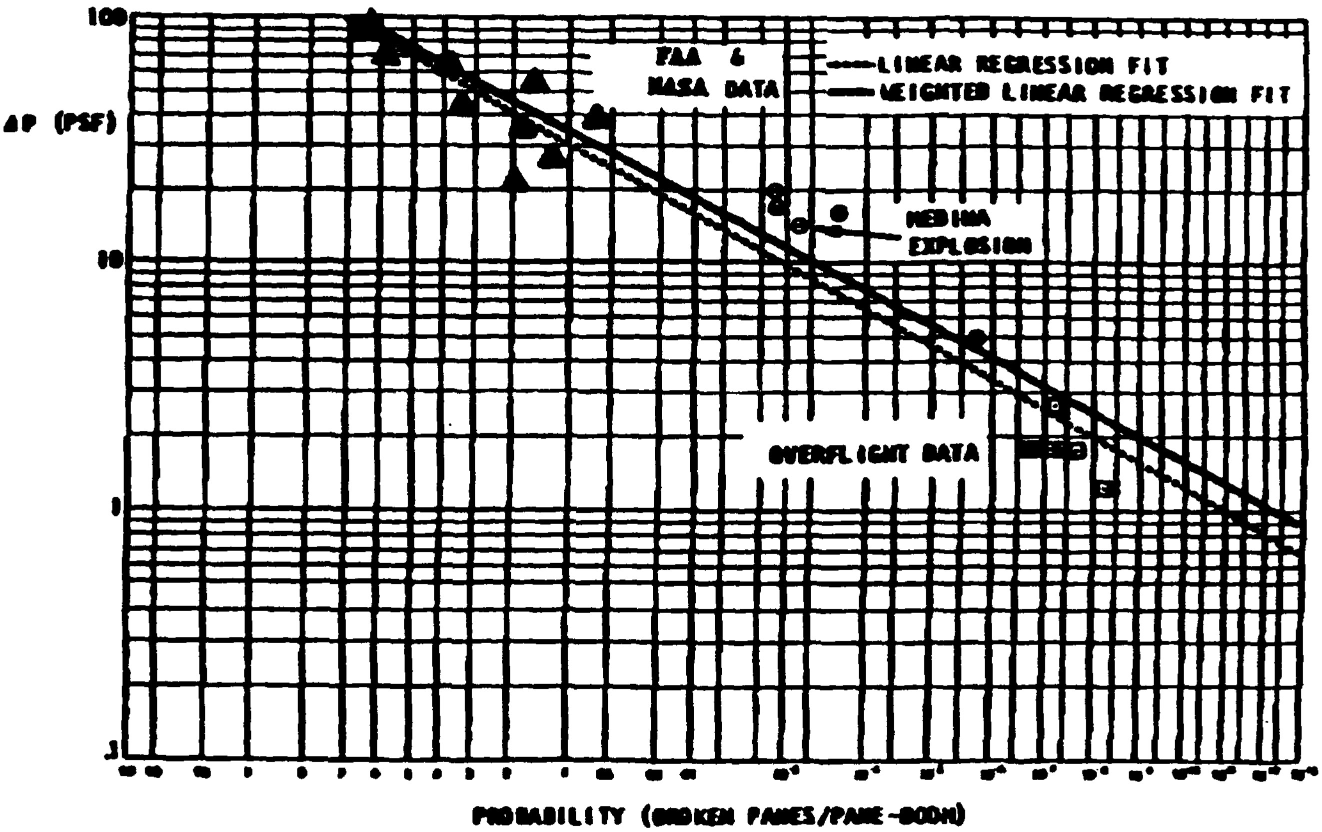

Figure 4.7-10. Accident and paid overflight glass claims plotted together with regression curves computed from NASA test information (based on Wiggins, 1969).

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the range predicted in a separate model by Hershey and Higgins (1976), which also includes breakage probabilities for wall plaster, bric-a-brac, and free-standing brick walls. These other effects involve damage to secondary structures and may, in some cases, represent a hazard to occupants. Damage to sensitive field equipment not designed to withstand such transient overpressure shocks is also possible. Near the lower end, less than 4 psf, almost no glass breakage is predicted. This could include sonic booms above 15,000 ft AGL, depending on the flight profile (Table 4.7-5).

Staging Bases

The proposed action involves the use of Hill AFB as the primary staging base, with Michael AAF as the secondary staging base. The addition of ECTC operations to these airfields for the proposed action will not appreciably increase the total operations at either base, so the change in noise levels will be relatively small.

Hill AFB - Noise Impact

A 1982 AICUZ study of Hill AFB shows an area within the L_{dn} 65 dB contour of approximately 27 sq. miles (Hill AFB, 1982). About 10 percent (2.7 sq. miles) of this area is incompatible (residential) land. This impact corresponds to an average of 320 daily departures of military aircraft. Estimating a 15 percent increase in baseline traffic by the year 2000, the Average Daily Departures (ADD) would be approximately 368. The average number of daily departures anticipated for ECTC from Hill AFB as the primary staging base is expected to be approximately 16 in the year 2000. Assuming 25 percent night operations for all take-offs and landings in the year 2000, compared to a currently estimated 5 percent night operations, the addition of ECTC operations would not increase the L_{dn} noise levels at any one point by more than 0.5 dB, assuming the same flight tracks are used. This would increase the noise

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impacted incompatible area within the L_{dn} contour by about 10 percent. Thus, assuming a residential population density within this incompatible area of 500 people per square mile, the addition of ECTC operations would increase the number of people within the L_{dn} 65 dB contour by about 135 people.

Michael AAF - Noise Impact

The projected baseline ADD from Michael AAF is 22, with 10.8 percent being night operations. ECTC operations in the year 2000 are estimated to be 0.8 ADD, with an estimated 25 percent at night. These figures indicate a change in L_{dn} values at any point around the airfield of less than 0.3 dB. Furthermore, there are no permanent residential buildings within 10 miles of Michael AAF, so this increase in level is not significant.

4.7.2 ALTERNATIVE VALLEYS

The only change in noise impacts compared with the proposed action will be due to flight operations.

4.7.2.1 Snake Valley

For this alternative, 70 percent of the low-level flight operations are assumed to enter through Snake Valley, which is west of Tule Valley. The flight tracks assumed for Snake Valley for three representative missions are presented in Figure 4.7-11. These are similar to the tracks for Tule Valley, but show the different splits assumed for Snake, Tule, and Whirlwind valleys, respectively. The resulting composite contours for baseline plus

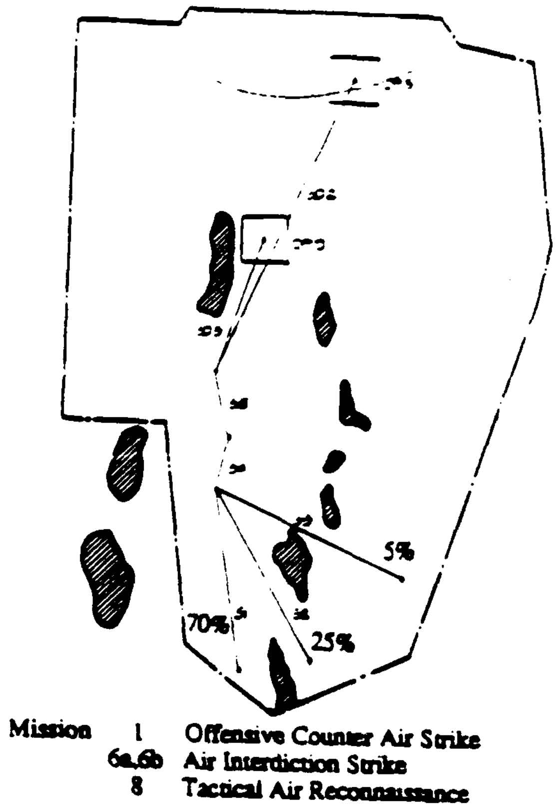

Figure 4.7-11. Nominal centerline of tracks and operating areas assumed for analysis of three typical ECTC missions - snake valley, year 2000.

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ECTC (subsonic and supersonic) for the year 2000 are shown in Figure 4.7-12. For this option, more populated sites lie within the contour areas. The areas within each of the composite contour levels equal to or above L_{dnmr} 60 dB are listed in The estimated total number of people "highly annoyed" would be less than one for

Table 4.7-6.

Areas, in Square Miles, Within Composite L_{dnmr} Contours
for Baseline and Baseline Plus ECTC Operations
(Snake Valley Alternative)

	1991		1993		2000	
L_{dnmr} dB	Baseline	+ECTC	Baseline	+ECTC	Baseline	+ECTC
60	226	878	288	1379	303	2090
70	55	55	84	100	84	711
80	7	7	9	9	11	119

1991, 5 for 1993, and 23 for 2000. Qualitatively, the impact for the Snake Valley option will have the same general character as described for Tule Valley. However, as indicated above, the estimated number of people "highly annoyed" increases from 7 for Tule to 23 for the Snake Valley alternative for the year 2000. About half of these people reside in Callao, the remainder in Trout Creek and several campgrounds and ranches in or north of Snake Valley. While the number of people in the "highly annoyed" category is only about one percent of the total population in the UTTR, the noise impact for these few people will be substantial. L_{dnmr} values reach 75 to 80 dB in five of the locations. This level of noise exposure is above the upper range of normally acceptable levels for residences around urban airports after sound insulation treatment; for residences in normally quiet rural areas, such a level of noise would have an even greater impact.

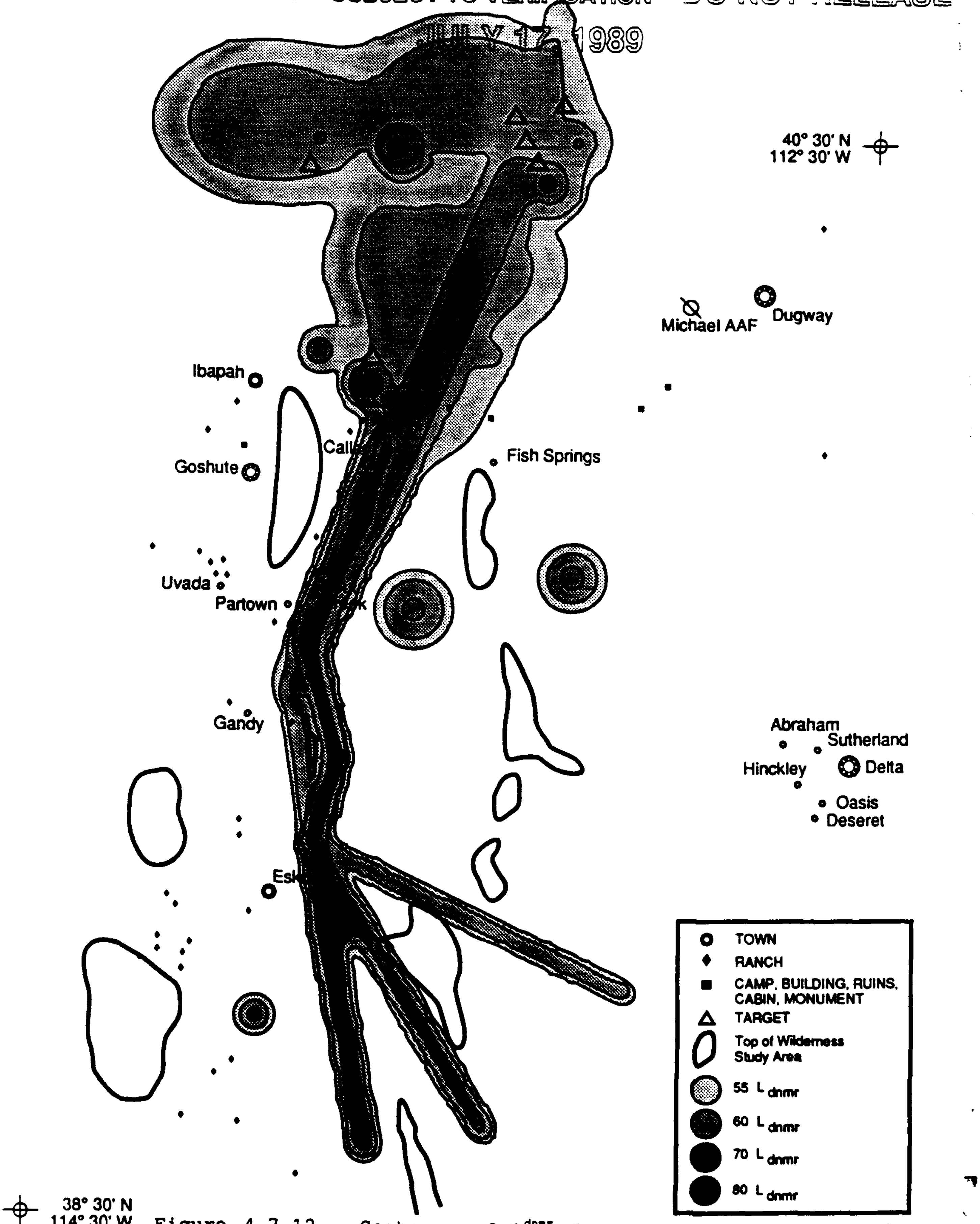

Figure 4.7-12. Contours of L^{dnmr} for ECTC composite (baseline + ECTC) operations - Snake Valley, year 2000.

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The single event noise levels experienced by the noise impacted population for the Snake Valley alternative will be higher than for Tule Valley, occasionally reaching maximum sound levels in the range of 115 to 125 dBA. The frequency of low-altitude overflights for the noise impacted residences will be greater than that for Figure 4.7-11. Nominal centerline of tracks and operating areas assumed for analysis of three typical ECTC missions - snake valley, year 2000. Tule Valley (i.e., 124 per week with 19 percent at night). Again, the majority of the overflights will tend to be north or east of the populated areas.

4.7.2.2 Whirlwind Valley

For this alternative, ECTC operations enter primarily through Whirlwind Valley, as indicated in Figure 4.7-13. The resulting composite contours for baseline and ECTC (subsonic and supersonic) are shown in Figure 4.7-14. Only one populated site (Fish Springs) is within the noise contour for this alternative area. The areas within each of the composite contour levels equal to or above L_{dnmr} 60 dB for each of the study years are listed in Table 4.7-7.

Table 4.7-7

Areas, in Square Miles, Within Composite L_{dnmr} Contours
for Baseline and Baseline Plus ECTC Operations
(Whirlwind Valley Alternative)

Ldnmr dB	1991 Baseline	1991 +ECTC	1993 Baseline	1993 +ECTC	2000 Baseline	2000 +ECTC
60	226	1008	288	1512	303	2400
70	55	55	84	97	84	682
80	7	7	9	9	11	64

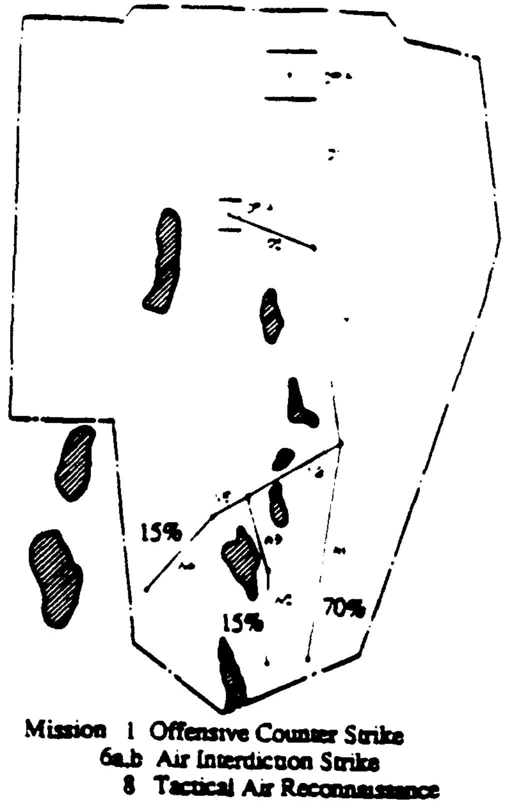

Figure 4.7-13. Nominal centerline of tracks and operating areas assumed for analysis of three typical ECTC missions - Whirlwind Valley, year 2000.

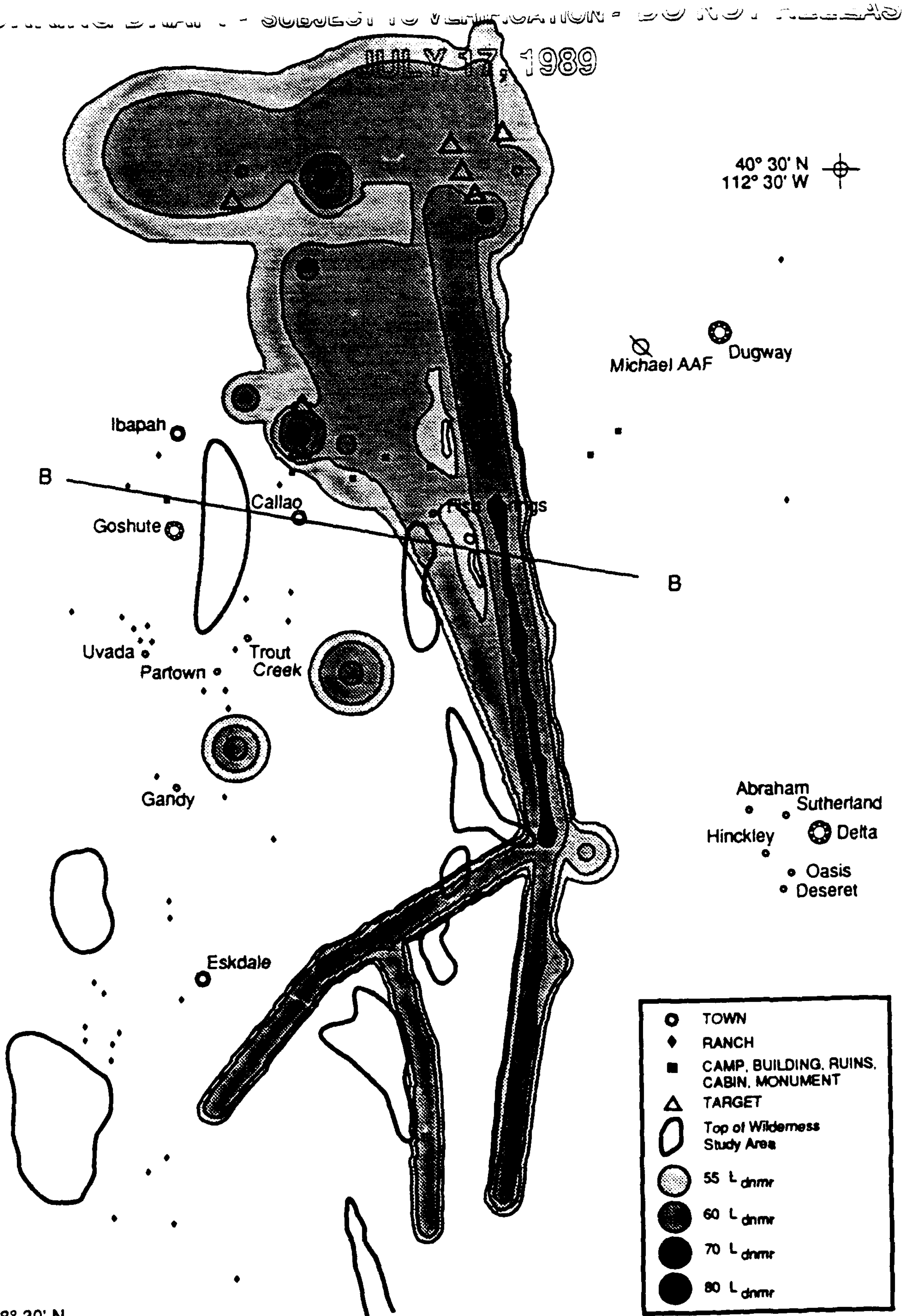

Figure 4.7-14. Contours of L^{dnmr} for ECTC composite (Baseline + ECTC) operations - Whirlwind Valley, year 2000.

The qualitative character of the noise impact for the Whirlwind Valley alternative would be the same as for Tule Valley; however, in this case the number of people "highly annoyed" reduces to just one person for the year 2000. The frequency and level of single events in this case will be comparable to that for the other two alternative valleys. The estimated number of single flyover events within 3 miles of the people around Fish Springs would be about 102 per week, with 20 percent at night. To allow a comparison of impact between the three valley alternatives, a profile of L_{dn} values for one cross-section (B-B) through the town of Callao is shown in Figure 4.7-15 for all three valley alternatives. Although the width of the noise impact region is greatest for the Whirlwind alternative, the impact on inhabited areas is least.

4.7.3 ALTERNATIVE PRIMARY STAGING BASES

The changes in noise impact around the staging bases are examined in this section for three alternative staging base options: (1) Michael AAF; (2) other local, i.e., SLC, Wendover, Delta, or Fillmore; or (3) remote staging.

4.7.3.1 Michael AFF

Construction

Michael AAF is located 10 miles east of the town of Dugway, so noise from any construction for this alternative is not significant.

Operations

The baseline aircraft operations at Michael AAF are expected to remain the same (12.8 average daily departures) until the year

2000, with nearly 50 percent of the activity from F-16s. Adding ECTC operations results in a 69 percent increase, to 22 ADD.

While there is a substantial increase in the area of the L_{dn} 60 contour (from 5.1 to 30.8 square miles in the year 2000) due to ECTC operations, because of the base's location relative to the nearest town, there is no impacted population around Michael AAF for any year, with or without ECTC. For operations at the secondary staging bases, the L_{dn} levels at Hill AFB due to ECTC would increase by about 0.2 dB, resulting in an increase in the number inside the Ldn contour by about 95.

4.7.3.2 Salt Lake International Airport (SLC)

Construction

Construction will generate noise. The L_{dn} 60 and 65 dB contours for this temporary noise impact could be approximated by circles with radii of about 385 to 725 ft and 340 to 550 ft, respectively. Residences within these areas could be slightly impacted.

There would be no noise impact for construction at the secondary staging bases (i.e., Hill AFB and Michael AAF). This statement of no impact is also valid for the other "local" primary staging base alternatives.

Operations

The Federal Aviation Regulation (FAR) Part 150 noise study (Reynolds et al., 1985) referred to above provided a basis for evaluating the noise impact for ECTC operations as outlined in Table 4.7-8. There would be no ECTC operations in 1991 and 1993.

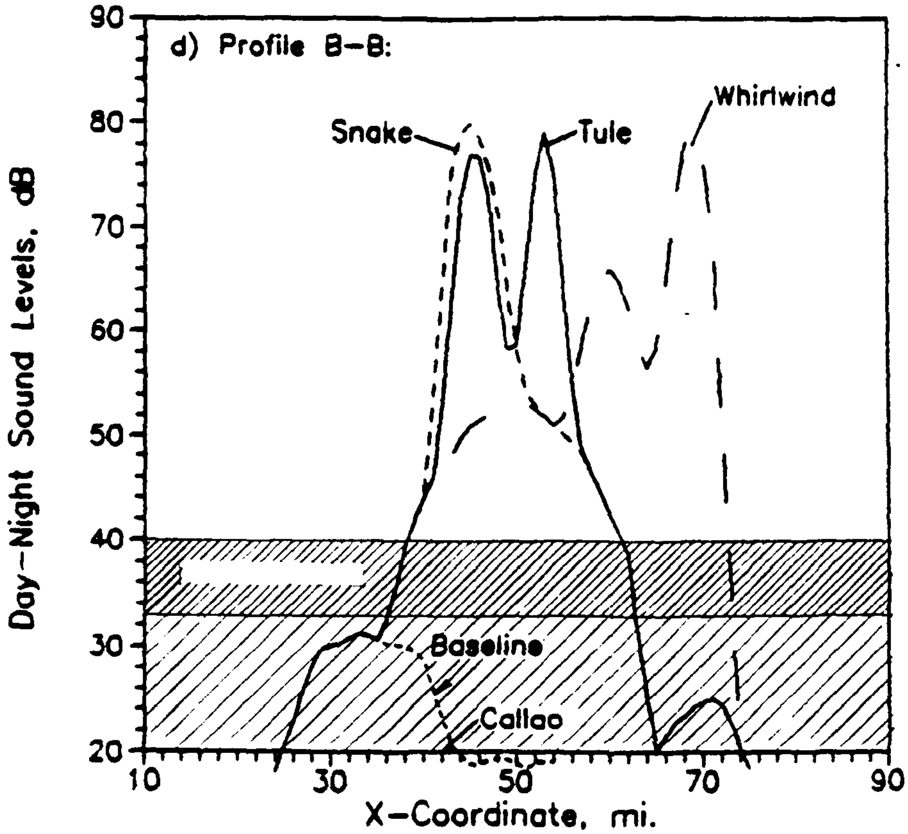

Figure 4.7-15. Comparison of profiles of L_{dnmr} values for the three valley alternatives through cross-section B-B identified in figure 4.7-11.

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For the year 2000, adding the ECTC operations would increase the noise impacted population inside the L_{dn} 65 contour by 11 percent, to 7,218. ECTC would increase the A-weighted maximum sound level of single events by approximately 5 dB due to noisier aircraft. Although there is little change in the average 24-hour noise level (L_{dn}), the increase in single event noise is considered an impact.

Table 4.7-8

Noise Impact from ECTC Operations at Salt Lake City International Airport Staging Base
(Based on data from Reynolds et. al., 1985)

	BASELINE			ECTC	TOTAL
YEAR	1984	1991	2000	2000	2000
ADD[1]	341.1	404.2	502.7	9.2	511.9
% Night Operations	2.2%	2.2%[2]	2.2%	20%	2.5
L_{dn} 65 Contour					
Area (mi^2)	11.63	13.55	16.49[4]	-	18.3[4]
Density (people/mi^2)	336.6	386.6	394.7[3]	-	394.7
Population	3915	5239	6509	-	7218

(1) Average Daily Departures.
(2) Estimated.
(3) Extrapolated assuming 1% increase per year in population density.
(4) Extrapolated.

For operations at the secondary staging bases, the L_{dn} levels at Hill AFB due to ECTC would increase by about 0.2 dB, resulting in an increase in the number of people inside the L_{dn} 65 dB contour by about 95. There is no increase in noise impact at Michael AAF.

4.7.3.3 Wendover Airfield

Construction

For the primary base, construction is likely to be outside of the baseline noise contours presented in the following section. The L_{dn} 60 and 65 dB contours for this temporary impact could be approximated by circles with radii of about 355 to 695 ft and 310 to 525 ft, respectively. Permanent residences do exist fairly near the airfield, so a temporary noise impact may be experienced by a limited residential population near the airport.

Operations

For the year 2000, the estimated baseline ADD from Wendover is 29 consisting primarily of single-engine propeller aircraft and business jets. This represents a projected 2 percent compounded growth from a 1988 data base (Yeager, 1989). ECTC operations would increase the ADD to about 37.4. However, the fraction of night operations increases from 5 percent (baseline future non-ECTC) to 8.8 percent (with ECTC).

Figure 4.7-16 shows the baseline and baseline plus ECTC noise contours and flight tracks for Wendover Airfield for the year 2000 based on these data. For the year 2000, the area inside the L_{dn} 60 contour impacted by aircraft activity at Wendover Airport increases from a baseline value of 2 square miles to 29 square miles with ECTC operations (see Figure 4.7-14). The estimated number of persons impacted increases from a baseline value of 0 to 1,167 with the addition of ECTC. This estimate is based upon no change in the runway position. Shifting the new runway away from the town of

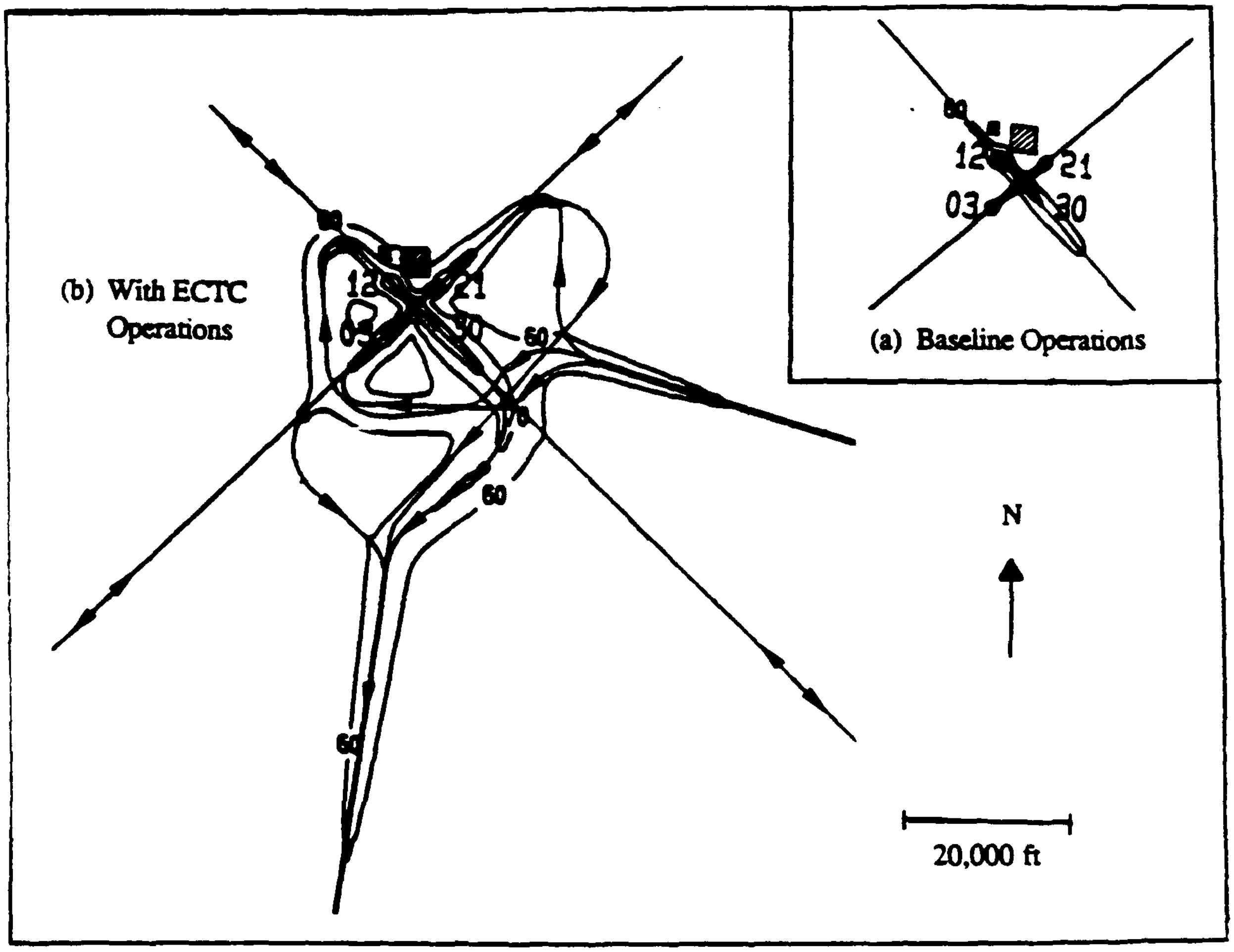

Figure 4.7-16. Noise contours for Wendover airfield for year 2000 for (a) baseline operations, and (b) baseline plus ECTC operations. Shaded areas show approximate boundary of inhabited areas

Wendover would still leave a significant impact. Single event levels will also increase substantially over those presently experienced. Noise-sensitive locations in town, such as schoolsor hospitals, are also expected to be impacted substantially. Addition of ECTC operations to Wendover Airport represents a very significant noise impact.

4.7.3.4 Delta Airfield

Construction

Construction for the primary staging base is likely to be outside of the baseline airport noise contours. The 60 and 65 dB contours for the temporary noise impact from construction could be approximated by circles with radii of about 385 to 725 ft and 340 to 550 ft, respectively. The town of Delta lies about 4.5 miles southwest of the airport, and since only two residences exist near the airfield, the temporary construction noise impact would be minimal.

Operations

The baseline (1988) general aviation aircraft operations at Delta are approximately 5.4 departures per day (Yeager, 1989). This level of operations is too small to generate any contours beyond the airport boundaries. Assuming the baseline operations increase 2 percent per year, traffic will increase to 6.8 departures per day by the year 2000, still resulting in negligible contour area coverage.

ECTC operations for the year 2000 are 8.5 ADD and the total resulting area within the L_{dn} 60 contour is 29.9 square miles. It is estimated that about six persons would be inside this L_{dn} 60 contour, shown in Figure 4.7-17. Noise impacts are considered to be small.

4.7.3.5 Fillmore Airfield

Construction

The Fillmore Airfield is located 2.1 miles west of the town of Fillmore. The construction noise impact for this alternative is approximately the same as for Delta (Section 4.7.3.3.).

Operations

The baseline (general aviation) aircraft operations in Fillmore are projected to increase from 2.7 departures per day for the year 1988 (Yeager, 1989) to 3.4 departures per day by the year 2000 (assuming 2 percent growth per year); this results in negligible contour area coverage.

ECTC operations for the year 2000 are 8.5 ADD, and the total area within the L_{dn} 60 contour is 32.0 square miles. It is estimated that 3,750 persons would be inside this L_{dn} 60 contour, shown in Figure 4.7-18. This is considered a significant impact.

4.7.3.6 Remote Staging

For this alternative, noise impacts would be similar to that discussed under the SLC alternative for secondary staging bases (Hill AFB and Michael AAF). that is, approximately 95 additional people would be exposed to L^{dn} levels of 65 dBA or higher at Hill AFB. There are no impacts associated with operations at Michael AAF.

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4.7.4 MITIGATION

Noise mitigation to minimize impact of aircraft noise from ECTC sorties will be limited to the application of acceptable constraints on flight operations, including:

- o Expand flight avoidance zones for Callao and Trout Creek.

- o Minimize the proportion of night operations that are carried out near inhabited areas.

- o Optimize the split of entry paths into the valleys to minimize noise impacts. For example, all other things being equal, entry through Whirlwind or Tule valley is preferred, in that order, over Snake Valley to minimize possible noise impact over fixed populated areas.

Due to the severe noise impact for a small number of people in the noise impacted communities for the Snake Valley alternative (e.g., Callao), the possibility of providing sound insulation for the affected residences may be considered as a final noise mitigation measure.

However, while sound insulation could reduce the overall cumulative noise impact indoors for such homes by 10 to 15 dB, the maximum single event noise levels, as heard indoors, would still tend to cause a fairly high degree of annoyance.

Abatement of noise from interim portable electric power sources for ground facilities, pending completion of permanent power, will be accomplished by requiring high-quality engine exhaust mufflers and possibly air inlet noise reduction systems. In documented cases of noise disturbance from these temporary power sources, use of partial or full enclosures may be warranted.

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Optimal design of the new Wendover runway would be parallel to, and south of, the existing 12-30 runway. Additional noise abatement may also be possible by careful design of safe departure and arrival tracks for ECTC aircraft.

Noise mitigation measures for Fillmore are the same as for Wendover (i.e., optimum selection of new runway, choice of departure andarrival tracks, and sound insulation). In this case, all of these steps might be required due to the large number of people (3,750 -- a majority of the town population) would be impacted by ECTC operations.

4.7.5 UNAVOIDABLE IMPACTS

4.7.5.1 Construction Noise

Temporary noise impact from construction of new ECTC facilities at Hill AFB represents one unavoidable but small increase in base noise emission that may impact nearby residences as a result of the proposed action. Construction noise is also unavoidable from construction of the RMF and the threat sites. However, in all cases, the temporary noise impact is not considered significant for people or for wildlife.

4.7.5.2 Operations

Noise from ECTC operations of the RMF and the threat sites is unavoidable, but is not considered a major problem. The dominant noise impact from the proposed ECTC operations is from low-altitude aircraft flights and is fundamentally unavoidable, although it can be partially mitigated. Noise impact from added staging operations at Hill AFB is unavoidable, but is considered an insignificant impact.

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4.7.5.3 Staging Bases

Salt Lake City International Airport

A small increase in impacted population is unavoidable.

Wendover Airfield

It is unlikely that the significant increase in impacted population can be avoided.

Fillmore Airfield

The unavoidable noise impact to Fillmore as a primary staging base is the highest of all alternatives discussed.

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4.8 LAND USE

Areas that could be affected by the ECTC include public lands managed by the Bureau of Land Management (BLM), State lands, and private property. The large majority are public lands managed by the BLM. BLM policy is to manage these lands for multiple use and sustained yield. The predominant public land uses in the project area are grazing, mining, and recreation, each of which is addressed in this section. State lands are also used for grazing and recreation, but mining is not permitted. Privately owned land is confined to Snake Valley and includes ranching and land uses associated with rural village communities. These will be addressed for the Snake Valley alternative.

The Federal Aviation Administration (FAA) has designated certain airspace used in conjunction with the UTTR as special use airspace. The FAA defines special use airspace as "airspace . . . wherein activities must be confined because of their nature, or wherein limitations are imposed upon aircraft operations that are not a part of those activities, or both (14 CFR 73.3). Special use airspace has designated altitude floors and ceilings. For the UTTR, the designated floors are 100 feet above ground level (AGL), except in certain Restricted areas over Department of Defense (DOD) owned land, where the airspace extends downward to the surface of the ground. Certain military training routes (MTRs) with various altitude assignments also transect parts of the UTTR or pass closely adjacent to it.

A potential land-use conflict exists between the Air Force's use of this assigned airspace and the construction of various types of obstructions, such as transmission-line towers, that might project into it, presenting a hazard to air operations. This condition exists under existing and projected future conditions at the UTTR, with or without implementation of the ECTC. The land-use

implications of this potential conflict have consequently not been analyzed here, because it represents a pre-existing condition and is not unique to the ECTC proposal.

Impacts to land use from implementing the Electronic Combat Test Capability (ECTC) program will be caused by ground disturbances for threat sites, the range maintenance facility (RMF), roads and other planned range construction, and from noise generated by low-flying aircraft.

The method used to evaluate land-use imparts is as follows: (1) all grazing, mining, recreation, and visually-sensitive areas were plotted on maps; (2) a map of the construction and operational aspects of the ECTC was prepared at the same scale as the map in (1); and (3) maps (1) and (2) were superimposed to determine the coincidence at protected lands and ECTC construction/operations.

The significance of impacts was judged primarily on an estimate of the extent of ground disturbance and the duration and loudness of jet noise over specific land-use areas considering their effects on people and animals.

4.8.1 PROPOSED ACTION

The Air Force does not intend to withdraw public lands for the ECTC or acquire state or private lands in fee. Instead, the Air Force will apply for rights-of-way (ROWs) from the BLM for threat sites, the gapfiller radar site, HAMOTS stations, roads, electric transmission lines, and other ECTC-related structures that will be located on public land. Some of these facilities, as well as the site for the RMF, are on state-owned lands that will be obtained through lease agreements with the State of Utah. As a result, the ECTC will have no impact on land ownership.

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Construction

Because of their short duration and limited geographic extent, construction impacts on land ownership, road access, agriculture, mining, recreation, and visual resources will not be significant.

ECTC construction activities on the UTTR will be phased over seven to eight years, so the amount of construction activity at any one time will be small. The peak construction year on the range will be 1993 when 20 threat sites with attendant access roads and the RMF will be under construction.

Construction activities can cause additional indirect impacts on grazing beyond the removal of vegetation (addressed under Operations). Construction work can cut off access to grazing and watering areas and disturb livestock. The construction sites for the ECTC are so small and scattered, however, that these effects will be minimal. Harassment of livestock by construction workers can be controlled through construction management. The number of construction workers will be small, and there is ample grazing area for livestock to be adequately removed from construction areas.

Construction activities tend to disturb a larger area than is ultimately used for facilities. This area remains vacant after construction has finished, and vegetation is allowed to reestablish. Undesirable weed species, such as halogeton, tend to establish in disturbed areas more quickly than desirable forage. Halogeton and other weed species currently occur in the region and can be expected to spread into areas disturbed by ECTC construction. The spread is expected to be minimal, however, and limited to areas immediately surrounding the threat sites and along roads. Here, weeds are most likely to occur because of previous disturbance. The impact is insignificant.

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Operations

ECTC operations have the potential for affecting grazing, mining, recreation, and visual resources. In addition, the proposed program has a potential for indirect effects on other land uses by affecting access throughout the ECTC arena. Public roads will occasionally be closed during particular ECTC tests where the safety of the public could be at risk.

Eventually, approximately 12 closures per year with an average duration of two hours could occur along roads leading to testing areas. These closures will be an inconvenience and a source of annoyance to people in the area; but will have no significant land use impacts. The following sections describe impacts of ECTC operations on grazing, mining, recreation and visual resources.

4.8.1.1 Grazing

Impacts on grazing include direct effects of removing vegetation from grazing allotments and indirect effects of noise and increase traffic. Grazing allotments in the ECTC program area are described in Section 3.8 and illustrated in Figure 3.8-2. Under the proposed action, several grazing allotments will be directly affected by the emplacement of threat sites, the construction of roads, and construction of the RMF.

Table 4.8-1 lists all the allotments that would be affected by surface disturbances for the proposed and alternative valleys. In no case is more than 0.2 percent of the surface within any allotment to be cleared of vegetation. In most cases, the percentage of surface disturbances within an allotment is much less than 0.2 percent. Surface disturbances caused by construction of ECTC facilities are not considered to be a significant impact to the animal unit months (AUMs) of any grazing allotment.

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Table 4.8-1 Surface distrubance of grazing allotments in Tule, Snake, and Whirlwind valleys.[a]

Allotment name[b]	Acreage of Federal grazing land[c]	Estimated acreage of disturbances (threat sites, roads, Range Maintenance Facilities, etc.)	Percent of allotment to be disturbed
Thousand Peaks	332,000	200	0.06
Gandy	53,000	32	0.06
Smith Creek	15,000	12	0.08
Knoll Spring	7,000	14	0.20
Cowboy Pass	41,000	43	0.10
Coyote Knolls	35,000	20	0.06
East Fish Springs	51,000	23	0.05
Sand Pass	32,000	33	0.09
Tatow	57,000	46	0.06
Swasey Knoll	47,000	53	0.09
Freight	13,000	14	0.09
Lady Laird	54,000	12	0.02
Spor Mountain	53,000	46	0.09
Wild Horse	44,000	26	0.05
Buckskin	22,000	9	0.04
Brown's Wash	26,000	35	0.13

[a] Includes only those allotments where more than 5 acres would be disturbed.

[b] Allotments are shown in Section 3.8.

[c] Data from U.S. Bureau of Land Management (1987a; 1987b).

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The potential for impacts of aircraft operations on livestock is related to the animals' reaction to the aircraft; direct effects on hearing are inconsequential. It should be recognized that animals exposed to aircraft activity may react to both sonic and visual stimuli. For example, Bond (1956) observed that dairy cows and beef cattle were alarmed by low-level, subsonic aircraft in a manner resembling their reactions to flying paper, strange persons, or other unfamiliar moving objects. Many researchers have noted that animal responses to aircraft are stronger when the aircraft is seen (e.g., Bond, 1971; Espmark, et. al., 1974; Anderson, 1987). Both visual and auditory considerations may explain the fact that low-level, subsonic military aircraft have provoked greater responses from livestock than sonic booms from mid-to-high altitude (more than 5,000 ft AGL) flights (Nixon, et. al., 1968; Anderson, 1987).

The conclusion of many researchers has been that sonic booms and subsonic aircraft noise occasionally startle livestock, but that the overall result is typically only a brief interruption of normal behavior (Cottereau, 1978; Shotton, 1982; Milligan, et al., 1983; Kull and Fisher, 1986; and Anderson, 1987). Research on white-tailed deer (Moen, et al., 1982) suggests that these types of behavioral responses are probably linked with transient physiological responses such as in heart rate, respiration, and endocrine function, but that physiological responses may occur without obvious behavioral changes. Laboratory experiments in which sheep were exposed to tape-recorded sounds revealed the dependence of physiological responses on sound frequency and pattern (i.e., music versus white noise), intensity, and duration, as well as the prior experience of the animals (Ames, 1978). Although laboratory experiments establish the possibility that sound may ultimately affect growth and reproduction, these sorts of effects have not been demonstrated in the field.

Nixon, et al., (1968) analyzed responses of livestock exposed to very low level (85 to 125 ft AGL) supersonic flight during Air Force training exercises near Tonopah, Nevada and found that livestock did not respond adversely to sonic booms. In the same study it was reported that cattle and horses occasionally ran in response to low-flying jets. Espmark, et. al., (1974) reported on the reaction of cattle and sheep to 28 sonic booms and 10 low altitude (50 - 200 meters AGL) subsonic flights (noise levels varied from 75 - 109 dB) over a 4-day period. No adverse effects were observed and behavioral reactions were minimal and of short-duration, although sheep reacted more strongly than cattle. Some animals were startled and reacted by jumping or running short distances. Espmark, et al., (1974), and others (e.g., Shotton, 1982; Anderson, 1987) have noted the potential for a confined or tied-up animal to injure itself if startled by aircraft.

Milk production over a 12-month period in 182 dairy herds located within three miles of Air Force bases using jet aircraft was found not to differ from that of herds that had not been exposed to similar jet traffic. Among the herds near Air Force bases, milk production was not affected by proximity to the end of a runway (Parker and Bayley, 1960). Casady and Lehmann (1967) found no difference in milk yields between dairy cows near Edwards Air Force Base (an area of heavy military jet traffic and frequent sonic booms) and cows not exposed to such stimuli. Shotton (1982) notes that cattle graze near target areas at the Avon Park Air Force Range and do not react to low-level passes by jet aircraft.

As part of the mitigation for the recently established Naval Air Station, Fallon Supersonic Operating Area, Anderson (1987) evaluated the impacts of military jet traffic on cattle and sheep production. There was no evidence of reduced production as a result of the initiation of supersonic training flights, and ranchers wrote that the flights were not affecting their livestock.

Direct observations were made of the effects of staged, low-level subsonic flights (A-7 aircraft at 400 knots at 500 ft AGL) and high-altitude supersonic flights (F/A-18 aircraft at 20,000 ft MSL). Temporary startle reactions to overflights were observed in some of the animals, with sheep generally reacting more strongly than cattle. In cattle, these reactions involved animals pricking their ears, raising their heads and, in a few cases, running a short distance (less than 10 meters). Normal activity was interrupted for a brief period (less than one minute) by overflights and none of the reactions observed was considered to have potential affects on production. Sheep were more likely to run and usually ran farther. Reactions to low-level subsonic flights, were stronger than to high-altitude supersonic flights.

Manci, et al., (1988) concluded that, as a rule, sound levels (from aircraft) in excess of 90 decibels (dB) would be adverse to mammals. Based on the guidelines of the American National Standards Institute, livestock farming and breeding are fully compatible up to a day-night average, A-weighted sound exposure level (L_{dn}) of 65 dB and are marginally compatible up to L_{dn} 75 dB. These guidelines may be useful in establishing thresholds for adverse, but not necessarily significant effects. An important consideration in the present case is that ECTC aircraft operations would be conducted within existing UTTR airspace. Livestock in the region are assumed to have had prior exposure to military aircraft operations, and reactions should, therefore, be lessened (Ames, 1978; Cottereau, 1978; Shotton, 1982).

The existing evidence does not suggest that military aircraft operations normally have adverse affects on the growth or reproduction of livestock or on the economics of ranching. Based on the foregoing, however, it is probable that aircraft operations associated with the ECTC would occasionally startle livestock. The potential for disturbance by low-flying, subsonic aircraft is at

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least as great as for disturbance by supersonic overflights. Nevertheless, overflight impacts on open rangeland are considered insignificant because they are unlikely to cause economic losses or severely disrupt ranching operations.

Indirect effects on grazing could occur as a result of increased traffic on improved roads in the area. Increased traffic, both ECTC-related and induced by improved roads, can disturb livestock and occasionally result in injuries. The majority of ECTC traffic will occur between off-range locations and the RMF. Traffic between the RMF and threat sites will be sporadic. Traffic traveling to and from the RMF will use existing roads, which will be improved and paved for the program. This could affect livestock in the Whirlwind Valley.

Induced traffic due to road improvements is not expected to be significant. The major roads to be improved already exist and are used for transportation between Snake Valley and the Wasatch Front area (primarily Delta). They also provide access to recreation areas within the UTTR. While recreation use is expected to increase slightly, the overall increase in non-ECTC traffic in the area will not be appreciable. New roads to be constructed for the ECTC will lead only to threat sites, which are not major attractors of induced traffic. Impacts from increased traffic on grazing will be insignificant.

4.8.1.2 Mining

The effects of the ECTC program on current and future mining operations are not expected to be significant for Tule Valley. ROWs to be obtained by the Air Force will not affect existing mineral exploration and development. Future exploration and development will depend on the nature of the ROW and on BLM management.

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The Air Force will require sand and gravel for various construction activities. A Free-Use Permit will be acquired from the BLM for borrow materials (sand and gravel). Upon receipt of the permit, the Air Force will abide by all written stipulations. The volume of sand and gravel needed for ECTC construction is estimated at about 1.4 million tons, regardless of the valley selected.

4.8.1.3 Recreation

The highest concentration of recreational activities are located north and east of the ECTC area. They include Utah, Deer Creek, and Great Salt lakes, the Wasatch and Fish Lake national forests, Simpson Springs, Camp Floyd-Stagecoach Inn, and the Little Sahara Recreation Area. Each of these areas would be unaffected by ECTC operations or by ECTC-related population increases.

The primary recreation resources within the UTTR proper are the Wilderness Study Areas (WSAs). Nine WSAs are located within the South Range of the UTTR: Fish Springs, Swasey, Howell Peak, Notch Peak, King Top, Wah Wah, Deep Creek, and Conger WSAs. These WSAs have a combined usage of 2,000 visitor-days per year, placing them among the lower-use areas in the state. Population increases due to the ECTC program are not anticipated to substantially increase the visitor days in local WSAs or recreation areas.

The major effect on the WSAs that may result from the ECTC project is due to an increase in low-level flight operations.

4.8.1.4 Visual Resources

Figure 4.8-1 shows the proximity of ECTC sites to visually sensitive areas defined by the BLM (1987a; 1987b). Other sites that will be used for the ECTC such as the gapfiller radar site are outside the range.

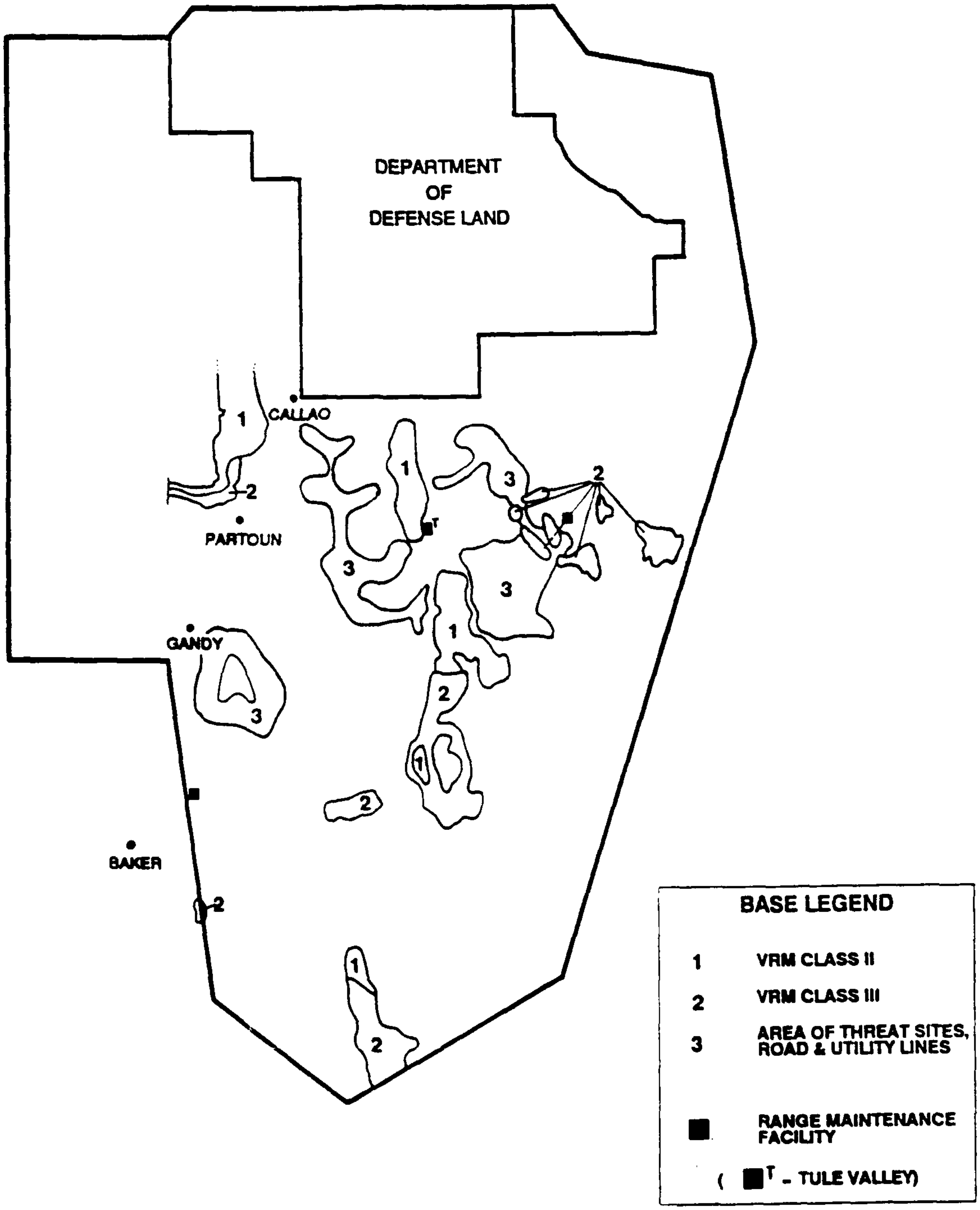

Figure 4.8-1. Proximity of surface disturbances in Tule, Snake or Whirlwind valleys to visually sensitive areas defined by BLM.

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The degree and significance of visual impacts on BLM lands depends on three characteristics: the scenic quality of the landscape; the visual sensitivity of the viewpoint; and the extent to which proposed modifications contrast with the existing landscape. The first two characteristics are considered in assigning VRM classes. The third determines the impacts of proposed programs such as the ECTC.

Only high-impact projects in sensitive areas require a contrast analysis. Sensitive areas are defined as VRM Class I and II and specially designated land uses such as wilderness. There are no Class I areas in the region of influence. In addition to the Class II areas, there are several Class III areas in the region that must be considered sensitive because they are associated with WSAs. There are no other sensitive land uses, such as scenic highways, parks, or landmarks.

Potentially high-impact projects include communications sites and powerlines. To be conservative, it was assumed that the ECTC threat sites, above-ground powerlines, and the RMF would qualify as potentially high-impact projects. All components of the project are structures except the sand and gravel borrow areas to be used for construction. Borrow areas will be selected in consultation with BLM to avoid significant impacts, so they were not evaluated.

Visual impacts from the ECTC were evaluated from critical viewpoints, which include recreation areas (the WSAs) and commonly traveled roads. It is questionable whether any road within the UTTR can be characterized as "commonly traveled" but the road from Delta to Callao was included in the analysis. Distance also affects impacts. Modifications are considered seldom seen from beyond 15 miles and were, therefore, not analyzed. The highest sensitivity is in the foreground-middle ground within five miles of the modification. Between 5 and 15 miles, views are considered

to be in the background but may still be sensitive to modifications.

None of the VRM Class II or III areas will be directly affected by ECTC construction. The only potential impacts to these areas are indirect; being able to see program components from them. In all cases, the ECTC threat sites, roads, and powerlines will be greater than five miles from the Class II and III areas, so there will be no foreground-middleground views. Because these components are small, impacts on background views are not expected to be significant.

The RMF at Sand Pass is extensive enough to affect both foreground-middleground and background views. It will be located at the southeastern base of the Fish Springs Range, which is designated VRM Class II. It will also lie along the Delta-Callao road. The site itself is State land, so it has no VRM class, but it will be visible from VRM Class II areas and the road. Assessing the degree and significance of impact will require a field evaluation and contrast rating.

The gapfiller radar site on Frisco Peak is in an area of relatively low visual sensitivity (VRM Class IV). This, combined with the small size of the radar facility, indicates that visual impacts would be minor. The gapfiller radar would not be seen from any VRM Class II or III areas.

Proposed staging activities would not have significant visual impacts. Hill Air Force Base (AFB) is currently a military air base, and ECTC facilities would not change its character. Michael Army Airfield (AAF) is located in Dugway Proving Ground (DPG) in an area with low sensitivity to visual impacts.

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4.8.2 ALTERNATIVE VALLEYS

4.8.2.1 Snake Valley

Snake Valley differs from Tule and Whirlwind valleys in that it has residential land uses, ranches, and towns. For this reason it is least compatible with the ECTC program. The primary impact on rural residential and associated land uses is noise, which is addressed in Section 4.7.

Grazing

The impacts to grazing allotments and grazing animals are similar to those described under the proposed action in Tule Valley, except that the allotments to be affected are somewhat different (Table 4.8-1 and Section 3.8).

The short- and long-term effects of noise from low-flying jets on cattle and domestic sheep are the same as those described under the proposed action.

Mining

Effects on mining under this alternative will be similar to the proposed action. The impact is negligible.

Recreation

Because Snake Valley has the fewest public recreation resources (WSAs), selection of the Snake Valley alternative would have the least effect on recreation areas from low-level aircraft operations. The flight profiles would come closest to the Wah Wah, King Top, and Deep Creek WSAs. More aircraft would be seen and heard from the Great Basin National Park.

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Visual Resources

The RMF for this alternative would be located 3 miles north of Highway 50 near Eskdale, where visual resources are not of particularly high quality (BLM, 1987a).

BLM lands in this area are VRM Class IV. The RMF would not be visible from any Class II or Class III areas. The gapfiller radar site on Tunnel Springs Mountain is also in a VRM Class IV area and is not visible from any Class II or III areas. None of the program components would be seen from U.S. 50, the only major travel through the area.

In addition to BLM and State lands, Snake Valley contains private land and communities in the program area. Although no private land will be directly affected, some threat sites will be visible from local communities if the Snake Valley alternative is selected.

The communities in the vicinity of ECTC sites include Callao, Front Creek, Partoun, and Gandy. A road runs through each of them, south to U.S. Route 50. With the exception of Gandy, all communities would be no closer than four miles from any threat site. At that distance, the ECTC facilities would not dominate the landscape. Four sites would be within approximately one to two miles of Gandy; six would lie within approximately one mile of a seven mile stretch of road south of Gandy. Seven of these 10 sites are part of the last complex to be constructed in 1996. A field evaluation is needed to determine the level of contrast and resultant visual impact of these sites.

4.8.2.2 Whirlwind Valley

Grazing

The impacts to grazing allotments and grazing animals are similar to those described under the proposed action in Tule Valley, except that the allotments to be affected are different (Table 4.8-1 and Section 3.8).

Mining

Effects on mining under this alternative will be similar to the proposed action. The impact is negligible.

Recreation

Whirlwind Valley is comparable to Tule Valley in its sensitivity to impacts on recreation resources in the WSAs.

Visual resources

Visual impacts from threat sites, power lines, and the gapfiller radar would be as described in the proposed action and would not be significant.

The site of the RMF for Whirlwind Valley is located two miles from the intersection of the Nephi-Sand Pass road and the road to Delta. This site lies within a cluster of VRM Class III areas as defined by the BLM (Figure 4.8-1; BLM, 1987a). It would not be visible from any Class II areas. An assessment of the impact will require a field evaluation and contrast rating.

4.8.3 PROPOSED AND ALTERNATIVE PRIMARY STAGING BASES

None of the staging bases alternatives are located in an area with grazing or mining, so there would be no impact on that land use.

Recreation

No recreation areas would be directly affected by staging base facilities. Indirect impacts from noise produced by low-altitude overflights would be insignificant because aircraft taking-off from or landing at any of the alternative locations would be at high-altitude over recreation areas.

Increased ECTC-related population in these areas will increase the demand for and use of recreational areas. Because these areas currently have low levels of use, any increase in demand resulting from ECTC-related population can be met by existing facilities without significantly stressing the resource.

Visual resources

None of alternative staging bases is located in a visually sensitive area. Furthermore, all of them are existing airfields. Modifications to Salt Lake International Airport (SLC) necessitated by the ECTC program would have no noticeable effect on the airport's image. Similarly, Wendover airfield would experience relatively minor visual changes, and the surrounding area does not have high visual quality. Wendover Airfield is on the National Register of Historic Places. However, the modifications proposed by the ECTC program would not be out of character with the existing environment. Michael AAF lies within DPG and would have no visual impact.

The airport at Delta is four miles from the town and surrounded mostly by undeveloped land. A golf course is located adjacent to the airport to the south. Areas in which users focus on the recreational activity itself are not inclined to be highly sensitive to external aesthetic effects. Therefore, the golf course is not considered highly sensitive to visual modifications that would occur at the airport. Users would focus on the immediate environment of the golf course itself and their recreational activity, rather than on background features.

The location most potentially sensitive to visual impacts from ECTC staging is the Fillmore alternative. THe airport is within a mile of the town. Nevertheless, the airport facilities would not be seen from the center of town or from main residential areas. South of the airport is an industrial park with a mushroom farm, which would not be sensitive to visual impacts. There are isolated residences north of the airport (2 trailers), but they are not considered in a visually sensitive area. Therefore, visual impacts from staging at Fillmore, like the other alternatives, would be insignificant.

4.8.4 MITIGATION

The impacts that the ECTC project would have on visual resources will be partially mitigated by careful site selection of construction sites and planning for the various facilities.

In order to avoid potentially significant effects of noise from low-flying aircraft on confined livestock, aircraft could be required to fly at least 1,000 ft AGL within a horizontal distance of 2,000 ft of any location where livestock are confined. These standoffs should be subject to adjustments, depending on the livestock and aircraft operations at issue.

4.8.5 UNAVOIDABLE IMPACTS

A very small area of rangeland will be unavailable to cattle and sheep. The impacts of ECTC low-level flight operations on recreational opportunities in either the proposed valley or the alternatives are unavoidable. Some recreation areas will experience an insignificant increase in use as a result of ECTC personnel. Visual resources will experience unavoidable impacts. Although visitor usage is low in the affected recreation areas, those participating in various recreational activities would be distracted, and their safety will be somewhat compromised by the sight and sound of low-flying aircraft. Range animals and wildlife could also be affected by aircraft noise, thereby affecting grazing and recreation.

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4.9 SOCIOECONOMICS

Direct and indirect effects of ECTC construction and operation employment and payrolls are considered in this section, along with the effects of associated spending in the region. These effects are quantified by reference to an input-output model prepared for the 13-county region. Population impacts resulting from increased employment opportunities are estimated, and allocated to local areas in the region. In some instances, population impacts such as these could lead to increased demands on housing and community services in these local areas. Increases in demand, however, are not expected to result in significant impacts. The degree of these impacts is determined through comparison to historical and current demands, and with regard to local housing and services capacity.

4.9.1 PROPOSED ACTION

Unlike construction of a large-fixed facility, such as a power plant, where work force peaks may over-shadow the operational work force, the ECTC construction work-force peak is relatively small. Many of the operational jobs will be filled by temporary duty (TDY) military, Department of Defense (DOD) civilian, and contractor personnel that are expected to have short term socioeconomic effects similar to those of construction workers. Therefore, a consolidated discussion of construction and operational effects of the ECTC project is presented in this section.

4.9.1.1 Economics

Direct and secondary employment associated with the proposed action are summarized by year in Table 4.9-1 (see also Figure 4.9-1).

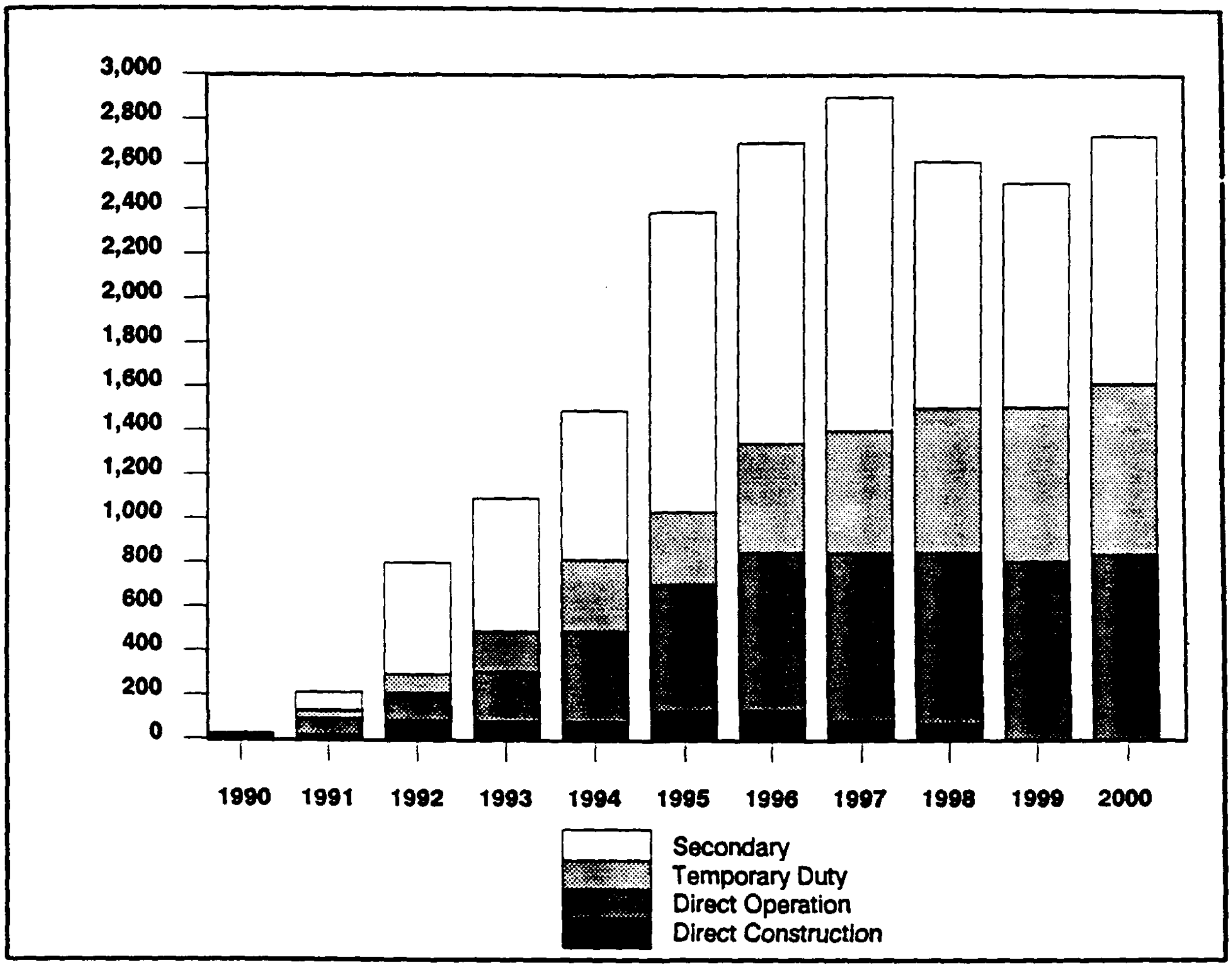

Figure 4.9-1 Direct and secondary jobs in region: proposed action.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Direct Jobs	19	128	321	526	781	1,042	1,336	1,396	1,451	1,430	1,553
Construction	19	26	102	92	92	143	143	101	63	0	0
Operation	0	102	219	433	689	899	1,193	1,295	1,387	1,430	1,553
Permanent	0	59	162	272	410	529	701	746	777	812	832
Temporary Duty											
FTE*	0	43	57	161	279	370	492	549	610	618	721
Peak	0	99	118	242	355	453	568	650	730	705	790
Secondary Jobs	14	92	491	566	733	1,373	1,373	1,447	1,123	1,072	1,157
Construction	14	32	353	291	231	678	464	453	71	0	0
Operaton	0	60	138	275	502	695	909	993	1,051	1,072	1,157
Total Jobs (FTE)	32	219	812	1,092	1,513	2,415	2,709	2,843	2,574	2,502	2,710

*Full Time Equivalent

Table 4.9-1 Direct and seconday jobs in region: proposed action.

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Sources and locations of direct ECTC jobs are presented in Chapter 2. Table 4.9-2 presents the most likely percentage distribution of residence locations for these direct workers.

Regional spending by direct workers employed during construction and operation, as well as regional project spending for goods and services, would create secondary jobs and spending in the region's economy. This spending would peak in 1997 at $59 million (all dollars reported are in 1988 dollars unless otherwise noted), resulting in an estimated 1,447 regional secondary jobs.

Total direct and secondary employment during construction and operations would contribute to a peak increase in regional payroll earnings of more than $51 million annually in both 1996 and 1997, excluding earnings by TDY personnel in the region. During full operation of the ECTC program, beginning in 2000, regional payroll earnings would total more than $45 million annually.

Most of this regional economic activity would occur in the metropolitan portion of the region where socioeconomic effects would readily be absorbed. Therefore, the following section present impacts to the rural counties that could be affected.

__Tooele County, UT__

As described in Chapter 2, construction and operations would occur at Michael Army Airfield (AAF) for secondary staging, the range maintenance facility near Wendover, as well as at the strategic threat area (STA) and intermediate threat area (ITA) threat sites located on land in Tooele County. It is anticipated that some of the workers that would obtain jobs at sites in Tooele County would reside in West Wendover in adjacent Elko County, NV. The level of

Table 4.9-2. Estimated residential locations of direct workers and place of work (in personnel)

Place of Residence	Hill AFB	Wendover Field	Michael AAF	Tule Valley	Frisco Peak
	Worker Reporting Site				
Tooele County					
Wendover, UT	0.0%	33.2%	0.0%	0.0%	0.0%
Dugway	0.0%	0.1%	38.0%	0.0%	0.0%
Rest of Tooele County	0.3%	1.5%	39.0%	0.1%	0.0%
Millard County					
Fillmore CCD	0.0%	0.0%	0.0%	3.6%	0.0%
Garrison-Sevier Lake CCD	0.0%	0.0%	0.0%	0.0%	0.0%
Rest of Millard County	0.0%	0.0%	0.0%	91.8%	0.0%
Elko County					
Baker Township	0.0%	52.2%	0.0%	0.0%	0.0%
Rest of Elko County	0.0%	0.9%	0.0%	0.0%	0.0%
White Pine County					
Baker Township	0.0%	0.0%	0.0%	0.0%	0.0%
Rest of White Pine County	0.0%	0.1%	0.0%	0.0%	0.0%
Beaver County	0.0%	0.0%	0.0%	0.3%	100.0%
Box Elder County	0.5%	0.0%	0.0%	0.0%	0.0%
Cache County	0.7%	0.0%	0.0%	0.0%	0.0%
Davis County	56.3%	1.0%	1.0%	0.0%	0.0%
Juab County	0.0%	0.0%	3.0%	1.7%	0.0%
Morgan County	1.2%	0.0%	0.0%	0.0%	0.0%
Salt Lake County	4.7%	10.1%	13.0%	0.2%	0.0%
Utah County	0.0%	0.3%	4.0%	2.3%	0.0%
Weber County	36.3%	0.7%	2.0%	0.0%	0.0%
ROI Total	100 %	100 %	100 %	100 %	100 %

Source: Estimated by Robert D. Niehaus, Inc. (RDN), March-April, 1989. Estimates for HIll AFB reporting site derived from 1987 data provided by T. Harding. Estimates for Michael AAF derived from data provided by K. Whitaker. Other estimates based on RDN's spatial interaction model.

Note: The number of workers reporting annually to each of the reporting sites listed are presented in Chapter 2. These numbers vary by alternative.

direct employment for county residents associated with construction of facilities for the ECTC program represents less than one percent of the county's 1988 employment. ECTC operations would result in about the same number of jobs for county residents as construction of facilities.

Juab County, UT

Although Juab County would experience an increase of about 120 permanent and 200 temporary duty jobs from operation of ECTC facilities located in the county, workers are expected to reside in Millard County, primarily in Delta. Only a few direct workers are expected to reside in Juab County during full operation of the ECTC program in 2000. Thus, the potential for population growth or population-related socioeconomic impacts is considered minimal in Juab County and is not discussed further in this Environmental Impact Statement (EIS).

Millard County, UT

No direct construction or operational jobs would be created within Millard County. However, more ECTC workers would reside in Millard County than in any other non-metropolitan county areas because of the proximity of the community of Delta and the connecting road network to work sites in Juab County. Daily travel to these sites from almost any other community in the region would involve one-way commutes in excess of 90 minutes.

During the peak of ECTC construction, the employment increase for county residents would be approximately one percent of the county's 1988 employment level. The permanent employment increase from operation for county residents is approximately two percent of the county's 1988 employment level.

Elko County, NV

Similar to Millard County, Elko County would receive additional employment by place of residence, although no direct construction jobs would be created within the county. Employment of Elko County residents is expected because of the proximity of West Wendover to work sites located in adjacent Tooele County. This employment increase for county residents, all of whom are expected to reside in West Wendover, is less than one percent of the county's 1988 employment level.

4.9.1.2 Population

This section presents estimates of population impacts to the region and to local areas within the region. Population effects are not evaluated as either beneficial or adverse in themselves; the demands that population exerts on housing, services, and public finances are presented in subsequent sections.

Region of Influence

Peak population impacts to the region as a whole from ECTC construction activities would occur during 1995. These peak impacts would total only about 200 new persons migrating to the region, including direct and secondary in-migrant workers and their families. Most of these people would reside in the Salt Lake-Ogden metropolitan area, where such a number would represent less than one-tenth of one percent of the total population. Due to concurrent activities involving both the winding down of ECTC construction and the gearing up of ECTC operations, peak population impacts to the region would occur in 1997. The total impact to the region would be about 800 persons that year. Population impacts of this magnitude from both construction and operations would not noticeably impact housing, community services, or public finances

in the metropolitan area; therefore, the following sections (which address these issues) do not consider adverse effects to this part of the region.

Total population impacts in the non-metropolitan areas would include some regional in-migrants plus people who relocate from other parts of the region in response to ECTC construction and operations employment opportunities. The population impacts presented below for these local areas include intra-regional migration, since these people would require housing and community services in the local area just as much as the in-migrants from outside the region. Their presence in these local areas, moreover, would represent a much larger percentage of without-project local population than is the case for the metropolitan areas, and greater relative socioeconomic impacts.

In addition to permanent population impacts, ECTC operations would involve fairly large numbers of TDY personnel. Although each TDY person would remain in the region for less than 90 days at a time, by the year 2000 their presence would be constant enough to seem like a permanent population increase in the areas where they were concentrated. Altogether, by the year 2000 there could be nearly 800 TDY persons in the region at any one time. More than half of them would be operating from Hill AFB, and would reside in temporary accommodations within the Salt Lake-Ogden urban area. Almost 220 TDY personnel would be stationed at the Range Maintenance Facility (RMF), and would likely populate the Delta area in their off-duty hours. There also would be about 70 such persons each at Michael AAF and at Wendover, temporarily residing in local areas adjacent to these duty stations. Since TDY personnel are not expected to be accompanied by families, are not likely to demand permanent housing, and would not otherwise place permanent demands on community services, their numbers are not included in the following discussions of population impacts to

local areas. Their lodging and subsistence spending is included in the economic impact analysis, however, and the effects of their presence are considered in the community services and public finance analyses that follow.

Figure 4.9-2 illustrates the difference between the population without the ECTC and with all construction and operations personnel in selected construction years and 1997. Although the total construction- and operations-related population impact would represent less than one percent of the region's population as a whole, local impacts to certain areas would be more dramatic relative to the populations of these areas. This situation is particularly true for the Delta area of Millard County, where most of the tactical threat area (TTA) sites and range maintenance personnel are expected to reside. The communities of Wendover and West Wendover would experience smaller but still important effects from operation of the STA sites and the RMF. Population effects from operation of secondary-staging facilities at Michael AAF would be felt in Dugway and Tooele, but these generally would be smaller than the construction-related impacts to these communities.

Local population impacts near Delta, Dugway, and Wendover include a number of migrants who would be likely to relocate from elsewhere in the region. They do not include population impacts associated with secondary-employment opportunities, however, since most of these secondary jobs would accrue to the metropolitan area in response to construction and operations expenditures. Table 4.9-3 shows the population impacts to the potentially affected communities in Tooele, Millard, and Elko counties.

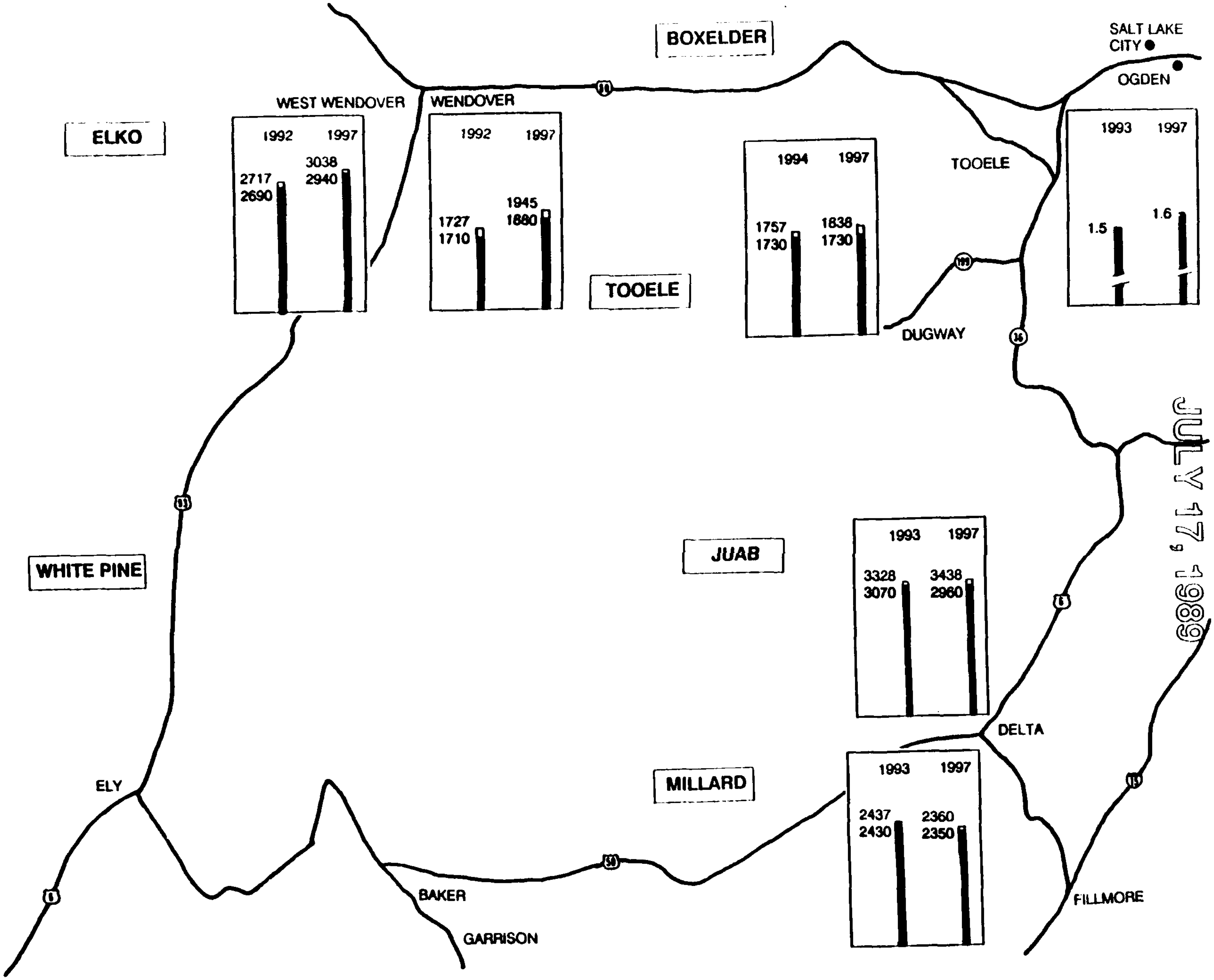

Figure 4.9-2. 1993 and 1997: Proposed Action.

Table 4.9-3. Population impacts to selected areas within the region of influence: proposed action

County Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Tooele, UT											
Construction	0	0	18	3	51	12	46	121	90	0	0
Operations											
Permanent	0	4	5	20	35	51	74	78	82	82	82
Temporary (peak)	0	1	2	20	23	75	78	90	93	93	93
Wendover											
Construction	0	016	3	13	11	16	0	0	0	0	0
Operations											
Permanent	0	1	1	11	22	32	33	35	35	35	35
Temporary (peak)	0	0	0	17	17	17	17	29	29	29	29
Dugway											
Construction	0	0	0	0	18	0	15	60	44	0	0
Operations											
Permanent	0	2	2	3	5	7	18	18	20	20	2
Temporary (peak)	0	1	2	3	6	28	30	30	31	31	31
Millard, UT.											
Construction	41	17	7	113	66	88	45	0	0	0	0
Operations											
Permanent	0	22	41	79	162	214	247	260	260	260	260
Temporary (peak)	0	25	25	74	131	131	194	218	218	218	218

Table 4.9-3. Population impacts to selected areas within the region of influence: proposed action (continued)

County Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	
Delta												
Construction	39	16	6	109	64	84	43	0	0	0	0	
Operations												
Permanent	0	21	39	75	156	206	238	250	250	250	250	Temporary
		0	25	25	74	131	131	194	218	218	218	
	218											
Elko, NV												
West Wendover												
Construction	0	0	26	5	21	18	25	0	0	0	0	
Operations												
Permanent	0	1	1	17	34	51	52	54	54	54	54	
Temporary(peak)	0	0	0	26	26	26	26	44	44	44	44	

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4.9.1.3 Transportation

Table 4.9-4 shows the estimated number of round trips added for year 2000 at all sites under the proposed action and alternatives based on the employment figures described in Section 2.1-3. A maximum of 900 additional round trips can be expected in and out of Hill Air Force Base (AFB). A previous study (JHK and Associates, 1987) indicates that the base entrance gates are currently operating near capacity during the peak hours. Level of service (LOS) "F," which is the worst rating possible, is experienced near the west gate and at the south gate during all peak periods. LOS "F" is an unacceptable level and indicates excessive delay and congestion at the gates. The southwest gate has an LOS ranging from "C" to "E," which are marginally acceptable ratings. The JHK study does not indicate any LOS problems on SR-193 and SR-232, except that LOS is at or near capacity at their intersection during the A.M. and P.M. peak periods.

Adding 900 vehicles to the peak hour traffic will exacerbate an already unacceptable LOS. Adding this traffic to SR-193 or SR-232 will not significantly affect LOS along these routes, except at their intersection. The additional traffic at the intersection of SR-193 and SR-232 during the A.M. and P.M. peak periods will exacerbate existing LOS problems at the intersection.

The JHK study did not consider the effects of opening a gate on the east side of the base. The origin/destination analysis in that study indicates that such a gate might draw a small portion of the traffic from the existing gates (especially the south gate) destined for areas on the east side of the runway. Currently, however, there is little or no demand for access to this area. Opening an eastern gate would reduce the impacts of additional traffic associated with the ECTC on the intersection of SR-193 and

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Table 4.9-4. Additional daily round trips

Vicinity	Action	Tule and Whirlwind Valley Alternatives and primary staging alternatives					
	Hill AFB	Michael AAF	SLC	Wendover	Delta	Fillmore	Remote
Hill AFB	894	680	680	680	680	680	680
Michael AAF	60	273	60	60	60	60	60
SLCIA	0	0	302	0	0	0	0
Wendover	79	70	70	344	79	79	79
Delta, Sand pass or Topas Mtn.	227	227	227	1227	505	227	277
Fillmore	0	0	0	0	0	278	0
SNAKE VALLEY ALTERNATIVE							
Ely, Bailed Garrison	227	227	227	227	227	227	227

*If selected replaces 227 trips in the vicinity of Delta.
Persons per vehicle is assumed to be 1.2 for urban trips and 1.5 for all other trips.

SR-232 as well as on the south gate. An eastern gate may also relieve some of the congestion existing at the south gate.

The additional traffic expected at locations other than Hill AFB is small in magnitude and will not cause significant impact to LOS. Comparison of the additional ECTC-related traffic near Delta (a maximum of 383 round trips per day) with the average daily traffic on US-6 in the area (ranging from 800 to 7,000 vehicles per day) indicates general LOS will not change (U.S. Department of Labor, 1988). Congestion may increase at intersections within Delta for brief periods of time, with durations on the order of minutes. Such congestion will not increase the average delay significantly, so LOS will not change.

Heavy vehicle trips to threat sites range from 23 round trips in 1991 to 130 round trips in 1995. In continuous operation, the ECTC program will generate about 90 heavy vehicle round trips annually. The average weight of a threat system heavy vehicle is 72,000 pounds; the weights range from 55,000 to 88,000 pounds. The incremental effects on paved surfaces of a maximum 260 trips per year will be insignificant, even if all trips use a common stretch of pavement. If unpaved access roads and bridges or culverts on these roads are not currently maintained at regular intervals, there will be deterioration in the surface or structures over time. The deterioration will increase as ECTC-related traffic increases. As a result, maintenance will be required. If unpaved roads are currently maintained, ECTC traffic will have little impact on the roads or, at most, cause a slightly higher frequency of maintenance.

In summary, the construction- and operational-traffic impacts to LOS of the ECTC program will be insignificant, with the exception of increased congestion at the entrances to Hill AFB during morning and evening rush hours. The impacts of ECTC traffic on paved

surfaces will be insignificant; however, ECTC traffic will likely necessitate increased maintenance on the gravel roads used to reach the threat sites.

During the public scoping process, the Bureau of Land Management (BLM) raised the issue of induced traffic resulting from road improvements into or through the area. Depending upon the magnitude of the inducement, impacts could occur by stressing ecosystems and altering lifestyles of people living in the area. Road improvements should be limited to paving existing gravel roads from the closest existing paved roads to the RMF and upgrading (but not paving) trails to provide access to threat sites. There are no planned improvements that would upgrade extensive portions of the gravel roads throughout the area. Consequently, the main potential inducement will be along the proposed paved road into the Sand Pass RMF. This road could increase accessibility to the southern portion of the Fish Springs Wilderness Study Area (WSA). The magnitude of this inducement was estimated by reviewing historical cases of road improvements into recreational areas in the southwest. The largest traffic increases, 100 to 700 percent, were associated with water recreation, whereas non-water recreation inducements ranged from 2 to 10 percent. The Fish Springs WSA has an estimated visitation rate of 75 people per year by the year 2005. Assuming that paving the road would double this estimate to 150 people per year, increased accessibility results in no significant impact.

4.9.1.4 Housing

Tooele County, UT

Permanent housing demand in Wendover is expected to increase slightly beginning in 1992, and to peak at 14 units for permanent operations personnel in 1996. In addition, there would be a peak

demand for 19 units to house TDY operations personnel in 1997. When this need for operational temporary housing is combined with the construction demand, 17 units would be needed in 1994. Demand for permanent housing at Dugway Proving Ground (DPG) would be less than 10 units. Current residency patterns indicate a similar number of permanent units would be required in the surrounding communities. Less than 45 temporary housing units would be required for operational personnel beginning in 1995. The combined demand for temporary housing near Dugway would reach about 90 units in 1997. Housing impacts within Tooele County would be slight and insignificant with the proposed action.

Millard County, UT

Demand for less than 10 permanent-housing units would begin in Delta in 1991 and build to a peak demand of over 100 units by 1997. Project permanent housing requirements could be accommodated in the near term and met by existing mobile homes or increased development during the later years of the 1990s. Temporary housing demand both for construction and operational personnel would begin in 1990 at less than 20 units, rise to about 100 by 1993, and remain near 150 units after 1996. Demand for temporary housing is within the current stock of mobile homes. Further, the Intermountain Power Project (IPP) housing complex near Lynndyl might provide further capacity for temporary housing, depending upon its availability. Assuming the current variety of the housing stock, housing impacts within Millard County would be slight under the proposed action. However, if mobile homes and the IPP complex are unavailable, the demand on housing stock would be significant in the short term.

Elko County, NV

Permanent housing demand resulting from the proposed action in West Wendover would begin in 1993 and stabilize at over 20 units by

1995. Temporary housing demand would be about 10 units in 1992 and remain between 25 and 30 units after 1994. Based upon the community's recent growth and current vacancies, the private market can meet this level of demand.

4.9.1.5 Community Services

Potential increases in demand from construction population for community services and facilities such as education, public safety, health care, and utilities are limited to those jurisdictions in the rural areas. Total population impacts in the rural counties represent a less than one percent increase over baseline levels. This level of in-migration is not expected to increase overall county service demand beyond current capacities in those counties. The following discussion highlights peak changes in service demand in selected rural communities. Program effects from both construction and operations in the metropolitan areas of Salt Lake City, Ogden, and Provo would be inappreciable and existing service systems in these cities would be able to meet project-related increases in demand.

Peak in-migration into Wendover, Utah would occur in 1997, and represents about 3.5 percent above the baseline population (Figure 4.9-2). Peak growth in the adjacent town of West Wendover also represents about a 3.5 percent increase. Slight additional demand would be placed upon community services and facilities in both Wendover and West Wendover, but these increases would not be significant.

Tooele County, UT

Enrollment increases in the Tooele School District attributable to ECTC operation would gradually escalate from five students in 1993 to 22 students in 1998. This increase would continue through all

subsequent years of the ECTC program operation. To maintain the district's current student/teacher ratio of 25.0, one additional teacher would be required to meet the increased enrollment demand. No additional facilities would be required.

Millard County, UT

Projected enrollment increases in the Millard School District from the ECTC program would peak in 1995 (85 students) and decline to 71 students by 1997. These students are enough to fill three and one-half to four classrooms. However, the majority of this increase would occur in and around Delta. Excess facility capacity is available in the four existing schools due to declining enrollments following completion of the Intermountain Power Plant. Therefore, Delta schools are expected to accommodate additional students with relatively little difficulty.

Elko County, NV

Nearly all enrollment increases in the Elko School District would occur in West Wendover. The student enrollment increase in the district from combined ECTC construction and operation would peak in 1996 with the addition of 22 students, all of which are expected to attend West Wendover School Elementary and Wendover High School in neighboring Wendover, Utah. From 1997 through all subsequent years of ECTC operation, an additional 16 students would reside in the district. Increases to West Wendover Elementary must also consider projected enrollment increases in Wendover, since the elementary school serves both communities. Including the 10 additional students projected for Wendover, Utah, from 1997 through all subsequent years of operation of the ECTC program, there would be a total increase of 25 students in Wendover area enrollments attributable to operation under the proposed action. Planned expansion of the West Wendover Elementary School, excess facility

capacity at Wendover High, and the probable distribution of these students somewhat evenly among all grades would enable the schools to accommodate this anticipated growth.

4.9.1.6 Local government and public finance

Project effects associated with ECTC construction and operations activities are presented for Millard County, the Millard County School District, and the City of Delta. Impacts to local governments other than these jurisdictions would be negligible and are not discussed.

Millard County, UT

Increases in county expenditures due to operations-related population in-migration is estimated at approximately $50,000 beginning in fiscal year (FY) 1997 and would continue at this level over the life of the program. This increase represents an approximate one percent increase over projected baseline expenditure levels during the FY 1997 to FY 2000 period. During the FY 1991 to FY 1997 period, the concurrent effects of both operations- and construction-related population in-migration on county expenditures would peak at approximately $55,000 in FY 1995, but would still represent only one percent increase over projected baseline levels in that year. The increase in expenditures is attributable principally to the additional public safety services required by the in-migrating population. Increases in revenues from additional state-shared revenue, transient lodging taxes, sales and use tax collections, charges for services, and other local tax and non-tax revenues would be sufficient to meet the expected increase in outlays.

Millard County School District

Operations-related increases in school district expenditures are estimated at approximately $140,000 in FY 1997 and would continue at this level over the life of the program. This represents an approximate 1.8 percent increase in projected baseline levels over the FY 1997 through FY 2000 period. During the FY 1991 to FY 1997 period, the concurrent effects of both operations-related pupils and construction-related pupils peak at an approximate increase of $160,000, occurring in FY 1995. Many of these pupils may be accommodated in existing classrooms and facilities, and actual district expenditures may be substantially less than $160,000. Increases in property taxes, sales and use taxes, and entitlements from the State Uniform School Fund would be sufficient to meet these expected outlays. Entitlements from P.L. 81-874 programs would remain minimal (less than $5,000 per year during operations).

City of Delta

Increases in city expenditures due to operations-related population in-migration is estimated at approximately $35,000 in FY 1997 and would continue at this level over the life of the program. This represents about a five percent increase above projected baseline levels over the FY 1997 to FY 2000 period. During the FY 1991 to FY 1997 period, the concurrent effects of both operations- and construction-related population in-migration would result in expenditure increases peaking at approximately $40,000 in FY 1995. This would represent about a six percent increase over projected baseline levels in this year. The expenditure increases are attributable to increased public safety service needs, although additional expenditures on recreational activities may be expected. Increases in intergovernmental transfers, local sales and use tax, collections, charges for services, and other tax and non-tax revenue sources would be sufficient to meet these expected outlays.

4.9.1.7 Community attitudes and lifestyles

Community attitudes regarding the ECTC project reflect the current residents' perspective of how the project may change their lifestyle. Throughout the region of influence, residents voiced several major issues during the scoping process and data-gathering phase of this EIS. While different individuals and groups placed different emphases on their areas of concern, the collective concerns relate to ECTC effects on a rural, western desert lifestyle. These lifestyle concerns centered on seven issues: ecological resources, cultural resources, access to and use of public lands, access to special use airspace, noise and sonic boom effects, adverse and beneficial socioeconomic impacts, and public health and safety impacts, particularly the perceived health effects of electromagnetic emissions. As a result of tnese attitudes, those issues have been a central focus of the analysis presented in this EIS study.

In the case of residents of the Salt Lake City-Ogden metropolitan area, ECTC activities will not substantially change the metropolitan lifestyle. The increased employment is likely to be viewed as beneficial, while the effects on associated increased demand upon community services will be within current service capacity and, therefore, not noticed.

These perceptions of employment and population growth effects on community services are also true of the communities in which various components of the proposed action are located. Delta would have the largest population impact outside the metropolitan area. The community recently underwent a period of significant expansion from 1980 through 1985 in response to the construction of the IPP near Lynndyl. As a result, current residents have experienced greater stresses on the local infrastructure in the past than is expected with the ECTC program in the future. While future

population and related service c mand increases are above the projected baseline level, the futu.e service demand is below the level experienced by residents in 1985. Similarly, future growth in Wendover and West Wendover from the ECTC would be within the range previously experienced by current residents. Thus, lifestyle changes from population increases are not likely to be a major concern in these communities. The lifestyle issues outside of these rural communities relate to noise annoyance and health and safety effects on ranchers, rural population centers, recreationists, livestock, and wildlife. These concerns are also related to perceived changes in financial characteristics, such as income of individual ranchers and value of property located under ECTC flight paths.

While issues that influence metropolitan, town, and rural attitudes have been addressed in each of the previous sections, the reader is referred to the following sections for additional discussion: Section 4.7 for discussion of annoyance from noise, Section 4.8 for rural land value issues, and Section 4.10 for discussions of health and safety concerns.

4.9.2 ALTERNATIVE VALLEYS

4.9.2.1 Economics

Region of influence

From a regional standpoint, economic impacts associated with either of the alternative valleys would be identical to those for the proposed action, since essentially the same numbers of jobs and the same amounts of regional spending would occur regardless of the valley selected for threat sites.

Locally, economic effects associated with the Whirlwind Valley alternative also would be distributed the same as the corresponding distribution for the proposed Tule Valley alternative. Under the Snake Valley alternative, there would be small differences in the distribution of resident employment opportunities. Specifically, almost all of the jobs accruing to residents of the Delta area under the proposed action and Whirlwind Valley alternative would accrue to residents of western Millard County, Utah, and eastern White Pine County, Nevada. Accordingly, the remainder of this alternative valley discussion of socioeconomic impacts focuses on these two counties, and all of the following discussion relates to the Snake Valley alternative.

Millard County, UT

Economic impacts overall to Millard County associated with the Snake Valley alternative would be about half of those associated with the proposed action. Moreover, these impacts would shift from the Delta area in the eastern part of the county to the Garrison area at the county's western edge.

White Pine County, NV

Whereas no discernible economic effects would occur in White Pine County under the proposed action, the peak effects to White Pine County under the Snake Valley alternative would approach 70 jobs in 1995. This peak effect would be about 1.8 percent of baseline employment in the county. About two-thirds of these jobs under both phases, as well as the corresponding earnings derived from them, would accrue to current or in-migrating residents of the Baker area on the eastern edge of the county; the remainder of these effects probably would accrue to residents of the Ely area.

4.9.2.2 Population

Region of Influence

Population impacts to the region would be the same for both alternative valleys as for the proposed action. The distribution of population impacts within the region would differ from the proposed action only in the case of the Snake Valley alternative, and only with respect to impacts in Millard County, Utah, and White Pine County, Nevada.

The TDY personnel assigned to the TTA RMF, about 220 of them at full ECTC operations, would be distributed differently under the Snake Valley alternative. Instead of populating the Delta area almost exclusively, as in the case of the proposed action, they would be more likely to seek temporary accommodations in the Garrison, Baker, and Ely areas. These personnel would be in addition to the local population impacts cited below.

Millard County, UT

Overall population impacts in Millard County associated with the Snake Valley alternative would be slightly more than half those resulting from the proposed action. ECTC construction-related population impacts in the county would peak at about 60 persons in 1993, compared to about 115 people under the proposed action. During operations, Snake Valley alternative population impacts would total about 140 persons in Millard County, far less than the 260 persons who would relocate to the county under the proposed action. Most of these persons would seek residence in the Garrison area of the western county as opposed to the areas in and around Delta.

White Pine County, NV

No population impacts would be anticipated for White Pine County under the proposed action. Peak construction-related population impacts in the county would total nearly 60 persons in 1993 if the Snake Valley alternative is selected. About 130 people would relocate to the county in response to operations-related jobs. When construction and operations are occurring simultaneously, the peak impacts (150 persons) to White Pine County would occur in 1995. This peak population impact would account for about 1.9 percent of existing resident population in the county. About two-thirds of this impact would accrue to the Baker area, and the rest would impact the more populous Ely area of the county.

4.9.2.3 Transportation

The discussion of proposed-action transportation impacts on the rural road network in Tule Valley (Section 4.9.1.3) is applicable to transportation considerations for the Snake Valley alternative.

4.9.2.4 Housing

Millard County, UT

Temporary housing demand for 9 units in Garrison would begin with construction in 1990, increase to about 75 units by 1996 as operational-TDY personnel arrive, and remain at about that level thereafter. Permanent housing requirements for operational personnel would begin with 5 units in 1991 and peak at 55 units by 1997. Construction of additional units would be required to meet either the permanent and temporary demand as the current housing stock includes only eight housing units, six mobile homes, and a single unit motel.

White Pine County, NV

The Snake Valley alternative would increase the housing demand in both Baker and Ely. The temporary housing demand for 6 units in the Baker community would begin with construction in 1990 and peak at 35 units as operational-TDY personnel arrive in 1997. Demand for permanent residences would increase from 6 in 1991 to 48 units by 1997. This level of demand would require construction of housing, because the current housing stock is limited and fully utilized. The housing demand in Ely would be smaller than in Baker or Garrison due to the distance from the RMF and threat sites. The demand for construction and operational TDY housing would be slight, increasing from less than 5 units to just over 20 units by 1996. Similarly, permanent housing demand would follow this pattern to a peak demand of less than 20 units. This slight increase in demand would be within the current housing market capabilities.

4.9.2.5 Community services and facilities

Millard County, UT

Limited community services such as law enforcement and eduction within Garrison are provided by Millard County and Millard County School District. Following construction of the RMF and threat sites, the additional 135 permanent residents and 115 TDY population would increase the community to about 270 residents. Although its size would increase over 12 times, Garrison would remain a small rural community with the potential for slight increases in community services and facilities.

Increases to public education services and facilities under the Snake Valley alternative would remain largely the same as under the proposed action. Notable changes in the distribution of enrollment

increases, however, would occur in the Millard School District. Under the Snake Valley alternative, increases to public education in the Millard School District would be shifted from schools in Delta, where infrastructure exists to accommodate enrollment increases at all grades, to schools in Garrison and Baker (in the White Pine School District).

Services such as law enforcement in Garrison would remain quite limited. However, additional services such as a centralized water supply and solid waste disposal site would be required as the community expanded.

White Pine County, NV

Under this valley alternative, Baker would attract a maximum of 90 permanent residents and 70 TDY operational personnel. This increase would nearly double the community's size in 1997 to 360 residents. Maintenance of the current law enforcement protection service level would require assigning a full-time deputy to the community. The water and wastewater systems are currently marginal and would require upgrading to maintain current services. Community services in Ely have sufficient capacity to accommodate any population increase under this alternative.

4.9.2.6 Local government and public finance

Region of influence

The distribution of population impacts and local government effects would differ from the proposed action only under the Snake Valley alternative. Population and associated expenditure impacts to Millard County jurisdictions would be about half of those estimated under the proposed action, and would represent less than one percent of the projected baseline levels in the potentially

affected jurisdictions. Population effects and associated expenditure and revenue impacts would be shifted to the Baker area in White Pine County and the Garrison area of Millard County. Because Baker and Garrison are not incorporated towns and the services provided to community residents there are provided by county agencies, the potentially affected jurisdictions discussed under this alternative are limited to White Pine County and the White Pine County School District.

White Pine County, NV

Construction-related expenditure impacts would occur over the FY 1990 to FY 1996 period. Increases in county expenditures would be minimal, approximately $20,000 during the peak year, and would represent less than one percent of projected baseline levels over the construction period. Concurrent operations-related workers and dependent immigration would result in slightly higher expenditure levels, approximately $45,000 in the peak year, but still would remain less than an one percent increase over projected baseline levels. Operation-phase population immigration would be slightly lower than peak levels and would require only about $40,000 in expenditures. Public safety and transportation service expenditures would be the principal outlays required. Increased state-shared revenue, transient lodging taxes, and sales and use tax revenue from both the basic and supplemental county relief programs would be sufficient to meet these additional outlays.

White Pine County School District

Construction-related increases in district expenditures would peak at approximately $45,000 in FY 1993, representing less than a one percent increase over projected district expenditures in that year. Concurrent operations-related and construction-related expenditure increases would peak at approximately $130,000 in FY 1995. This

level of increase would represent about a 1.7 percent increase over projected baseline levels in that year. With construction activities ending in FY 1996, steady-state operations begin in FY 1997 with expenditure impacts of approximately $110,000, representing about a two percent increase over projected baseline levels over the FY 1997 to FY 2000 period. Revenues from additional entitlements from the State Distributive School Fund, local support taxes, and other tax and non-tax revenue would be sufficient to meet the projected outlays. Capacity constraints at elementary facilities in the Baker area may require additional capital outlays or other mitigative measures to relieve potential overcrowding in this area. Reserve bonding capacity in the White Pine County School District of approximately $15.3 million as of FY 1988 would be sufficient to meet any projected capital requirements.

4.9.3 ALTERNATIVE PRIMARY STAGING BASES

4.9.3.1 Economics

Region of influence

The largest differences between the primary staging base alternatives are exhibited during the construction phase. These differences are most readily revealed by comparison of regional spending effects. For the proposed action a total of approximately $118.3 million would be spent in the region as a direct result of ECTC construction. This total would be spent over a nine-year period from 1990 through 1998, and includes construction of a set of core facilities that would need to be constructed regardless of the primary staging base alternative selected. These core facilities are described in Chapter 2. Because of these care facilities, construction period economic impacts of the various

primary staging alternatives can be differentiated on the basis of construction requirements at the various potential staging bases.

Regional economic effects associated with construction of primary staging facilities at Michael AAF ($133 million) would be $15 million more than for the proposed action. Staging at Salt Lake City International (SLC) results in regional effects of $109 million, which is slightly less than the proposed action. The Wendover and Delta primary staging alternatives each result in regional spending of $143 million, nearly $25 million more than the proposed alternative. The Fillmore staging alternative has about the same regional effects as the Michael AAF alternative. The least regional spending is associated with the remote primary staging, for which there would be about $82 million, $36 million less than the proposed action. Operations-related economic effects do not vary by staging alternative as dramatically as those associated with construction, but differences do exist.

Considering the full range of regional economic effects, including construction and operations effects together as well as direct and secondary economic impacts, the peak year would be 1997 for all alternatives. Employment impacts (not including TDY personnel) of the proposed action and primary staging base alternatives in 1997 are as follows:

Primary Staging Base	Direct Employment	Secondary Employment	Total
Proposed	847	1447	2294
Michael	883	1507	2390
SLC	985	1634	2619
Wendover	1022	1473	2495
Delta	1062	1718	2780
Fillmore	1062	1717	2779
Remote	849	1246	2095

The largest of these sets of total employment impacts (Delta or Fillmore) represents less than one-half of one percent of total 1986 employment in the region. Nearly all of the secondary jobs and a large portion of the direct jobs would accrue to residents of the metropolitan areas of the region. The remaining employment opportunities would be distributed in different ways locally, depending on the staging alternative selected.

Tooele County, UT

Primary staging at either Michael AAF or Wendover would result in much greater economic impacts in Tooele County than would result from the proposed action. Peak direct employment by place of residence in Tooele County would be about 210 jobs in 1996, counting both construction and operations effects, if primary staging is at Michael AAF. This number is more than one percent of total 1988 employment in the county. With the Wendover alternative, the peak would occur in 1997 at about 150 jobs, slightly over one percent of the 1988 employment total. These impacts compare to peak employment of less than 90 county residents from the proposed action.

Millard County, UT

Economic impacts in Millard County would be greater than for the proposed action if either the Delta or Fillmore primary staging alternatives are selected. More than twice as many operations jobs and more than four times as many construction jobs would accrue to county residents under either of these alternatives as compared to the proposed action. The jobs associated with Delta staging would result in peak construction employment of nearly 175 jobs (in 1995) for Delta-area residents, and eventual operations employment opportunities of 240 jobs. With construction and operations

together, almost 340 jobs would accrue to Delta area residents in the peak year (1996).

Whereas only a handful of jobs would be filled by Fillmore-area residents under most of the staging alternatives (no more than 10 in any year for the proposed action, remote staging, or staging at Michael AAF, SLC, or Wendover, and only about 20 at the peak for staging at Delta), there would be nearly 120 direct construction jobs (in 1996) and 125 operations jobs for area residents if Fillmore is selected as the primary staging base. The peak employment impact for residents of this area, as construction and operations impacts overlap for this alternative, would be almost 200 jobs in 1996.

Elko County, NV

Economic impacts to Elko County would be small under the proposed action, or with any primary staging alternative except Wendover. A peak of only about 10 construction jobs and less than 25 permanent operations jobs would accrue to county residents, specifically residents of West Wendover, under any of these other alternatives. With primary staging at Wendover, however, ECTC-related construction employment would peak at more than 100 jobs (in 1995 and 1996) and operations employment in the year 2000 would approach 115 jobs for the county. In 1996, when construction and operations are both occurring, total-employment impacts for Elko county residents would be 175 jobs. This figure represents over one percent of 1988 employment in the county.

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4.9.3.2 Population

Region of influence

There is hardly any difference between the various primary staging alternatives in terms of population impacts to the region as a whole. Remote staging would cause slightly less regional immigration than the proposed action. All other alternatives would lead to slightly greater population impacts than the proposed action, but none of the alternatives would increase total regional population by even one-tenth of one percent. Key differences between the primary staging base alternatives exist in a geographical sense, and are manifested in the local areas surrounding Michael AAF, Wendover, Delta, and Fillmore. The choice between the proposed action and either remote staging or staging at SLC would not affect local areas outside the metropolitan area of the region. Population impacts to Juab County would be negligible despite the alternative selected. For these reasons, the following sections consider socioeconomic impacts of the staging alternatives for the following five cases: Tooele County (Michael AAF or Wendover), Millard County (Delta or Fillmore), and Elko County (Wendover).

TDY personnel at the peak of operations also would locate within the region differently depending on the location of the primary staging base. With the remote staging alternative, however, TDY personnel would not be assigned to the region. Under the other alternatives they would be likely to demand temporary residences in the communities nearest the primary staging base. These persons are not included in the permanent population impacts cited below, but were considered in the housing and community services analysis. Table 4.9-5 illustrates how peak population impacts vary among the primary staging bases for Tooele, Millard, and Elko counties.

Table 4.9-5. Peak population change in rural counties by primary staging alternative.

County	Proposed Action: Hill AFB Yr.	Hill AFB Pop.	Primary Staging Alternative: Michael AAF Yr.	Michael AAF Pop.	Salt Lake Int'l Yr.	Salt Lake Int'l Pop.	Wendover Yr.	Wendover Pop.	Delta Yr.	Delta Pop.	Fillmore Yr.	Fillmore Pop.	Remote Yr.	Remote Pop
Tooele, Utah														
Construction	1997	121	1995	314	1997	121	1995	176	1997	121	1997	121	1997	121
Operations														
Permanent	1998	82	11998	200	1998	82	1999	242	1998	82	1998	82	1998	82
Temporary	1998	93	2000	344	1998	93	2000	195	1998	93	1998	93	1998	93
Millard, UT														
Construction	1993	113	1993	113	1993	113	1995	113	1995	389	1995	371	1993	113
Operations														
Permanent	1997	260	1997	260	1997	260	1999	260	1999	641	1999	668	1997	260
Temporary	1997	218	1997	218	1997	218	1997	218	2000	467	2000	467	1007	218
Elko, NV														
Construction	1992	26	1992	26	1992	26	1995	236	1992	26	1992	26	1992	26
Operations														
Permanent	197	55	1997	55	1997	55	1999	301	1997	55	1997	55	1997	55
Temporary	1997	44	1997	44	1997	44	2000	193	1997	44	197	44	1997	44

Note: 1. Temporary population is the peak temporary duty population at one point during the year.

2. The shaded entries indicate the alternative inducing the highest population change for each county.

4.9.3.3 Transportation

The transportation discussion of the proposed action generally applies to each of the alternative primary staging alternatives. However, the daily round trips associated with each of these alternatives varies by the employment. Table 4.9-4 (Section 4.9.1.3) illustrates this variation and allows comparison with the proposed action.

4.9.3.4 Housing

Temporary housing demand generated by temporary duty personnel is a major component of the operations of each staging alternative. To meet a portion of this demand, a billeting and dining hall which will accommodate 100 persons is planned for the proposed action and each primary staging alternative. The facility's planned availability would be in 1997.

Tooele County, UT

Primary staging at Michael AAF

The peak construction and TDY housing requirement of about 260 units would occur in Dugway and the surrounding communities in 1996. This demand is almost three times the demand under the proposed action. However, the planned billeting facility and existing group quarters at Dugway would accommodate the increased temporary housing demand. The housing requirement for permanent-operations personnel would be slight until 1996 when about 50 units or five times that of the proposed action would be required. Permanent personnel are expected to maintain a residency pattern similar to what currently exists. Thus, about one-half of these units would be required at Dugway, with the remainder in the

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surrounding communities. The current housing at Dugway would accommodate this level of demand.

Primary staging at Wendover

The housing demands under this alternative are substantially larger than under the proposed action. Similar to the proposed action the demand will be felt both in Wendover, Utah and West Wendover, Nevada. Temporary housing demand associated with construction and operational-TDY personnel would begin with less than 10 units in 1992, peak at nearly 110 units in 1996, drop to 65 units in 1997, and rise to 85 units by the year 2000. The proposed billeting facility would accommodate some of the TDY demand after 1997. Motel/casino rooms may accommodate the remaining demand. Permanent housing demand in Wendover would increase slowly until 1994, when would begin a more rapid increase to 80 units by the year 2000. This demand level is beyond the current housing stock and would require market development.

Millard County, UT

Primary staging at Delta

Construction and TDY-related temporary housing demand in or near Delta would begin in 1990, increase to about 100 units by 1993, and continue to rise to above 300 in the year 2000 under either the proposed action or Whirlwind Valley option. After 1997, 100 units of this demand would be met by project billeting. Permanent housing demand under either of these valley options would begin for less than 10 units in 1991 and steadily increase each year to stabilize at about 100 units by 1996. Under the Snake Valley alternative, both the temporary and permanent housing demand in Delta would be reduced, as the construction and operation of the threat sites and RMF are outside the range of daily travel.

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Temporary housing demand would begin for 21 units in 1993, peak for 231 units in 1996, drop to 138 units in 1997 and increase to nearly 170 units by the year 2000. Permanent housing demand would begin for 37 units in 1994 and steadily rise to about 200 units by the year 2000. The current vacant housing units in Delta could meet the demand under either valley alternative. However, as in the proposed action on-going market adjustments will affect the future availability of capacity.

Primary staging at Fillmore

Temporary construction and operational TDY housing demand in Fillmore would begin for 24 units in 1994, peak at over 200 units in 1996, drop to 135 units in 1997, and rise steadily to nearly 170 units in the year 2000. The project billeting would accommodate all but 70 units after 1997. Permanent housing demand in Fillmore would be less than 10 through 1994, and increase from 35 in 1995 to nearly 140 by 1998 and thereafter.

Elko County, NV

Primary staging at Wendover results in housing demand in West Wendover, Nevada. Under this alternative, temporary housing demand from construction and operations TDY personnel would be slight until 1994, peak at 166 in 1996 and remain between 90 to 130 through the year 2000. The proposed billeting facility at Wendover would accommodate the TDY demand allocated to that portion of the adjacent communities and meet about one-third of the demand allocated to West Wendover. The motel/casino capacity may also meet the remaining temporary demand in this community. The demand for permanent housing grows slightly until 1995 when it begins a faster rise to a demand for over 120 units in the year 2000. This demand would require market development.

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4.9.3.5 Community services and facilities

Total community service and facility demand as well as student enrollment increases in the region would remain fairly consistent under each alternate primary staging base scenario. However, the distribution of the demand and enrollment changes within the region. These changes would mirror the differences discussed above with respect to population impacts.

4.9.3.6 Local government and public finance

The following discussion of fiscal impacts is focused upon non-metropolitan jurisdictions. Impacts to Millard County jurisdictions under the Michael AAF and Wendover staging alternatives would be similar to those described under the proposed action. Similarly, impacts to Tooele County jurisdictions under staging alternatives at Delta and Fillmore would be similar to those described under the proposed action.

Tooele County, UT

Primary Staging at Michael AAF

Construction of facilities and the related population immigration associated with primary staging at Michael AAF would result in expenditure impacts in Tooele County of approximately $40,000 in the peak year FY 1995, representing less than a one percent increase over projected baseline levels. With the concurrent presence of some of the operational work force during the construction phase, expenditures would peak at $55,000 in FY 1996. This impact would represent less than one percent of projected baseline levels. Operations phase expenditures (FY 2000 and beyond) would amount to approximately $20,000 per year. Increases in state-shared revenue, transient lodging taxes, sales and use

tax collections, and other local tax and non-tax revenue as well as increased state-shared revenue would be sufficient to meet these additional outlays.

In the Tooele County School District, construction-related expenditure impacts peak at approximately $180,000 in FY 1995. This increase represents less than a one percent increase over projected baseline levels. With the concurrent presence of some of the operational work force during the construction phase, expenditure impacts would peak at $260,000 in FY 1996. This increase would represent slightly more than a one percent increase over projected baseline levels. Operations phase expenditures (FY 2000 and beyond) would amount to approximately $100,000 per year. Increases in entitlements from State Uniform School Fund and other local tax and non-tax revenues would be sufficient to meet these additional outlays. Capacity constraints at elementary schools in Tooele City, however, may require additional outlays for capital construction.

In-migration to the City of Tooele is estimated at less than 100 persons during the operations phase which would require little response by city service agencies and thus few expenditure requirements.

Primary staging at Wendover

Expenditure impacts in Tooele County from location of primary staging at Wendover would peak at about $20,000 in FY 1996 during construction. With the concurrent presence of some of the operational work force during the construction phase, expenditures would peak at about $40,000 in FY 1997. These increases represent less than a one percent increases over projected baseline levels. Operations phase impacts (FY 2000 and beyond) would amount to about $25,000 per year. Increases in state-shared revenue, local tax

and non-tax revenue, fines, fees, and charges for services would be sufficient to meet these estimated outlays.

In the Tooele County School District, construction-related expenditure impacts peak at approximately $100,000 in FY 1996. This increase represents less than a one percent increase over projected baseline levels. With the concurrent presence of some of the operational work force during the construction phase, expenditure impacts would peak at $240,000 in FY 1997. This increase would represent slightly more than a one percent increase over projected baseline levels in that year. Operations phase expenditures (FY 2000 and beyond) would amount to approximately $170,000 per year. Increases in entitlements from State Uniform School Fund and other local tax and non-tax revenues would be sufficient to meet these additional outlays.

Millard County, UT

Primary Staging at Delta

County expenditures during construction would peak at approximately $70,000 in FY 1995, representing an increase of about 2 percent over projected baseline levels. With the concurrent presence of some of the operational workforce during the construction period, expenditure impacts would peak at $150,000 in FY 1996 and represent almost a four percent increase over projected baseline levels. Operation phase expenditure requirements are estimated at approximately $120,000. Increased revenues from state-shared revenue, transient lodging taxes, sales and use tax collections, charges for services, and other local tax and non-tax revenue would be sufficient to meet these expected outlays.

School district expenditures during construction would peak at approximately $220,000 in FY 1995, representing about a three

percent increase over projected baseline levels. With the concurrent presence of some operations workers and their dependents during the construction period expenditure impacts would peak at $520,000 in FY 1996, representing almost a seven percent increase over projected baseline levels. Operations phase expenditure requirements would be approximately $440,000 beginning in FY 1999 and continuing at this level over the life of the program. Increased revenues from State Uniform School Fund entitlements and other local tax and non-tax sources would be sufficient to meet these expected outlays. Entitlements from P.L. 81-874 programs would be limited to those "B" pupils living in the community and would represent less than $10,000 per year.

Construction-related expenditure impacts in Delta would peak at approximately $50,000 in FY 1995, representing about an eight percent increase over projected baseline levels. With the concurrent presence of some of the operational work force during the construction period, expenditure impacts would peak at approximately $110,000 in FY 1996. Steady-state operation phase expenditure impacts are approximately $80,000 which would represent about a 13 percent increase over projected baseline levels in FY 2000. Increased sales and use tax collections, property tax revenue, state-shared revenue, and other local tax and non-tax revenue would be sufficient to meet these expected outlays.

Primary Staging at Fillmore

Under this alternative, City of Fillmore expenditures would peak at approximately $30,000 because of the additional construction activities around the Fillmore area. With the concurrent presence of some of the operational work force during the construction period, peak expenditures would be about $50,000, representing about a 12 percent increase over projected baseline levels in that year. Operations-related expenditure requirements would be

approximately $20,000 beginning in FY 1999 and would continue at this level over the life of the program. Primary staging at Fillmore would reduce expenditure impacts to Delta by about half of those estimated for the Delta staging alternative. County and school district impacts would remain essentially unchanged under this alternative from those estimated under the Delta alternative. However, with the shifting of population effects from Delta to the Fillmore area, capacity constraints at elementary facilities in the Fillmore area may require additional capital outlays to relieve potential overcrowding in the area elementary schools. Reserve bonding capacity in the Millard County School District of approximately $5.7 million as of FY 1988 would be sufficient, however, to meet any projected capital requirements.

Elko County, NV

Primary Staging at Wendover

Construction-related fiscal effects of this alternative are expected to be experienced by Elko County and the Elko County School District. The majority of the in-migrants to the area are expected to settle in West Wendover. The services provided to the community residents and the finances associated with these services are administered by the county.

Construction-related expenditure increase in Elko County would peak at approximately $50,000 in FY 1995. This increase would represent less than a one percent increase over projected baseline levels. With the concurrent presence of some of the operations work force personnel during the construction period, expenditures would peak at about $100,000 but still represent less than a one percent increase over projected baseline levels. Operations phase expenditures would amount to approximately $50,000 beginning in FY 1998 and would at this level over the life of the program.

Revenues from intergovernmental transfers, basic and supplementary sales and use tax revenue, and other local tax and non-tax revenues would be sufficient to meet this expected outlays.

In the Elko County School District, construction-related expenditure impacts peak at approximately $190,000 in FY 1995, representing less than a one percent increase over projected baseline levels. With the concurrent presence of some operation work-force personnel during the construction phase, expenditure impacts would peak at $390,000 in FY 1996 and would represent less than a two percent increase over projected baseline levels. Operations phase expenditures would amount to approximately $330,000 beginning in FY 1998 and would continue at this level over the life of the program. Revenues from additional entitlements from the State Distributive School Fund, local support taxes, and other tax and non-tax revenue would be sufficient to meet projected outlays. Revenue from P.L. 81-874 programs would be limited to contributions for "B" pupils living in the communities and would amount to less than $10,000 per year. Some capital construction may be required in the West Wendover area to accommodate the additional elementary students projected in both the West Wendover and Wendover, Utah areas (both of which attend schools in West Wendover). Reserve bonding capacity in the Elko County School District would be sufficient to meet any projected capital requirements.

4.9.4 CUMULATIVE IMPACTS

The potential for cumulative socioeconomic impacts greater in magnitude than those projected for the proposed action or its alternatives could result in locations where other major projects are proposed to occur. There are at least eight such projects that have this potential and are described in Section 4.1.

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None of these projects is so large that their effects would change conclusions with regard to the regional socioeconomic effects of the ECTC program. Close juxtaposition of these proposals with construction and operation activities at specific ECTC facilities, in both space and time, could result in significantly greater impacts for certain local areas. The following sections focus on the potential for these local effects.

4.9.4.1 Economics

Tooele County, UT

Economic effects from the three incineration facilities and the U.S. Army mission realignment would mostly be felt in Tooele County. Considering the three facilities together, these effects would be much greater in the county than the economic effects of ECTC activities. The USPCI project, which would be the largest of the incinerators, is projected to provide more direct jobs in Tooele County than the ECTC primary staging alternative that would most affect employment in the county. Another 75 construction jobs and 76 operations positions are projected for the Aptus facility. Employment associated with the Tooele Army Depot chemical disposal facility has not yet been estimated. If all of these proposed projects are approved, and if they all occur in the same time frame as ECTC activities, then the cumulative impacts to Tooele County's economy can be estimated by quadrupling the effects of the Michael AAF primary staging alternative alone. Such a quadrupling represents the maximum potential cumulative effects.

Tooele County's economy would greatly benefit by the cumulative effects of ECTC with these projects. Between 500 and 600 full-time-equivalent construction jobs and nearly 400 jobs related to operations could be created. Associated spending and indirect effects would create additional employment opportunities. Such

impacts would represent four to five percent of baseline employment in Tooele County, and would similarly impact earnings in the county. Compared to the local impacts of the ECTC proposed action alone (less than one percent of baseline employment), these cumulative effects are especially noteworthy.

Millard County, UT

Only a portion of the Southwest Intertie Project would be constructed in Millard County, and the impacts of that construction activity would be minor in comparison to ECTC construction impacts, particularly if either Delta or Fillmore is selected as the primary staging alternative. No other major projects are projected for this area.

Elko County, NV

Jobs created by construction of the Thousand Springs Power Plant would overshadow the economic impacts of ECTC construction in Elko County. These jobs would be as far as 90 minutes away from West Wendover, however, where almost all of the ECTC-related economic impacts to the county would be concentrated. The City of Wells and other small communities would be much closer than Wendover to the power plant. These intervening communities probably would absorb the economic impacts of the power plant before they reached the West Wendover area.

Part of the Southwest Intertie Project construction would occur closer to West Wendover than the Thousand Springs Power Plant, and thus is more likely to involve residents of West Wendover. This construction would have temporary effects, and impacts of ECTC operations would be more lasting in this part of Elko County.

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White Pine County, NV

Construction and operation of the White Pine Power Plant would involve about 2,350 and 530 jobs, respectively, and operation of the proposed maximum security prison would require more than 300 persons. Compared to these impacts, ECTC economic effects under the Snake Valley alternative would be negligible.

4.9.4.2 Population

The distribution of cumulative population impacts would mirror the distribution of cumulative economic effects. As opposed to repeating the sources of these effects and the details of this distribution, only the salient features are presented in the following discussions of local area population effects.

Tooele County, UT

More than 1,000 persons would relocate to Tooele County during construction of the three incineration facilities and the ECTC under the Michael AAF primary staging base alternative. During full operation of all these projects, the population impact to the county would be about 800 persons. Under this maximum impact scenario (Section 4.9.4.1), cumulative population impacts in Tooele County would be about four times as great as the ECTC impacts associated with primary staging at Michael AAF. Most of these effects would be located in the eastern half of the county.

Millard County, UT

Cumulative population impacts in Millard County would not be substantially greater than the ECTC-related impacts alone. Differences would occur during construction of the Southwest Intertie Project's transmission line through the county. After

that period, ECTC operations would account for nearly all of the population impacts associated with cumulative proposed projects affecting the county.

Elko County, NV

Overall population impacts to Elko County from the cumulative effect of proposed projects would be much larger than population impacts associated with ECTC construction and operation. These impacts would affect communities in the vicinity of Wells, Nevada, while the ECTC would affect West Wendover.

White PIne County NV

White Pine Power Plant construction could temporarily increase the county's population by 46 percent, and operation of the power plant could account for a long-term, 13 percent population increase. Another 13.5 percent increase in county population is projected from operation of the maximum security prison. Most of these impacts would be felt in the Ely area. By contrast, the ECTC-related peak population impact associated with the Snake Valley alternative would increase total county population by less than two percent, and most of that impact would be in the Baker area.

4.9.4.3 Transportation

Cumulative transportation effects will follow the employment effects on selected parts of the regional road network. This level of use is not expected to exceed current road capacities.

4.9.4.4 Housing

Depending upon the timing, duration, and location of construction associated with these projects, the cumulative demand for temporary

housing could exceed the existing supply in eastern Tooele County, the Delta and Fillmore areas of Millard County, and Ely in White Pine County, Nevada. Available permanent housing stocks could easily be exceeded by demand in these communities.

4.9.4.5 Community services and facilities

The distribution of cumulative student enrollment impacts and community service and facility demand would follow the distribution of cumulative population effects.

Tooele County, UT

Under the maximum impact scenario (Section 4.9.4.1), cumulative population impacts in the county would be as much as four times as great as the ECTC impacts associated with the primary staging alternative at Michael AAF, which maximizes impacts to Tooele County. Enrollment and service demand increases could place burdens on existing facilities. In particular, schools in the City of Tooele that already operate near or above capacity could be severely strained to accommodate increased demand.

Millard County, UT

Cumulative community service impacts associated with the construction of the Southwest Intertie Project through portions of Millard County would be minor and would not substantially add to impacts attributable to ECTC alone. Any enrollment impacts would be concentrated in the Delta area.

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Elko County, NV

Although community service impacts associated with increased population attributable to the construction of the Thousand Springs Power Plant would need to be addressed by the Elko School District and Elko County, these impacts would be concentrated in the Elko area and would not create additional crowding of schools or increase demand in West Wendover, where ECTC impacts would occur.

White Pine County, NV

Under the Snake Valley alternative, community service impacts in the White Pine School District and White Pine County would occur in Baker and Ely, while impacts related to the construction and operation of the White Pine Power Plant and the maximum security prison would occur in Ely and areas to the north. Cumulative impacts from these projects and ECTC would occur only in Ely, where increased demand could be accommodated by existing capacity.

4.9.4.6 Local government and public finance

Except for the cumulative effects of the other proposed projects in the Tooele County area (Sections 4.9.4.1 and 4.9.4.2), the cumulative economic and population impacts, and thus potential fiscal effects, in the communities of interest to the ECTC program would not be substantially greater than the ECTC-related impacts alone.

The cumulative effect of other proposed projects that would affect Tooele County jurisdictions would be about four times greater than the ECTC impact under the Michael AAF staging alternative. This cumulative fiscal impact would result almost entirely from effects associated with other projects. Because of the relative size of

other projects, some additional capital investments (i.e., school facilities, police, and fire protection equipment) may be required. These needs would most likely be required in the Tooele and Wendover areas.

4.9.5 MITIGATION

With the exception of transportation, none of the socioeconomic effects discussed in this section necessitate mitigation. Degradation of unpaved roads could result from ECTC-related traffic. If degradation occurs, the Air Force will provide assistance for maintaining the current quality of gravel roads, as stipulated in agreements between the Air Force and the affected counties.

4.9.6 UNAVOIDABLE IMPACTS

No unavoidable impacts have been identified for economic, population, transportation, housing, community service and facilities, or local government issues.

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4.10 WATER RESOURCES

The amount of water to be used for the ECTC is small compared to the regional availability of ground water. The quantity of water required during any year of the ECTC program will not exceed 3,900 acre-ft. For all alternatives, maximum water use will occur during 1996-1997 when construction is at a peak and operations are nearing capacity. Most of the water to be used during ECTC operations will be for domestic and culinary purposes at the staging bases and at the range maintenance facilities (RMFs).

Water for ECTC facilities to be constructed at Dugway Proving Ground and in cities and towns off the UTTR would be supplied by municipal water-distribution systems.

An underground source of water will be utilized for construction and operations on the UTTR for either the proposed or alternative actions. Specific wells and/or well locations have not yet been identified. Before ground water is extracted, the Air Force will apply for a water appropriation permit from the Utah State Engineer. Issuance of this permit depends upon a determination by the State Engineer that the water required will not impact existing water rights.

The source of water for the staging bases, as well as other facilities to be located in cities or towns, would be from existing water-distribution systems.

Impacts to water quality from the ECTC are expected to be negligible under the proposed action or the alternatives. A septic tank and leach field will be constructed at the RMF according to State regulations. Sewage at threat sites will be collected in chemical toilets. Industrial wastes (including hazardous wastes) will be collected from the RMF and other sites generating such

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wastes, trucked to Hill Air Force Base (AFB), and disposed of according to existing procedures for the base (as an alternative, the base may arrange for a contractor to pick up the waste at the RMF and other sites). Accidental spills of hazardous substances at the RMF and other sites will be cleaned up according to the Spill Prevention Contingency and Countermeasure Plan (1988) for Hill AFB.

4.10.1 PROPOSED ACTION

4.10.1.1 Construction

Tule Valley

During peak construction, about 600 acre-ft will be required annually for construction of the threat sites, radar sites, range maintenance facilities, and for construction workers. Average annual water use during the construction period (1990 to 1998) will be about 500 acre-ft.

The Utah State Engineer has closed Tule Valley to new water appropriations. The State Engineer can, however, grant temporary permits for water appropriations from existing wells.

The perennial water yield from Tule Valley is not known. The amount of water required for construction under the proposed action, however, is small compared to the yields of ground water basins in west-central Utah, which are generally measured in tens of thousands of acre-ft. Impacts to other water users will not occur and the flow of springs in the area will not be affected by ground water extractions for the ECTC.

Wendover RMF

Water required annually for construction of the RMF, including water requirements of construction workers, would be less than 150 acre-ft. From 1992 to 1996, annual water use would average about 50 acre-ft.

Water supply and capacity of the water-distribution system in Wendover are not factors that limit water availability in the area. Currently, however, the size of pipe in the distribution system limits the system's ability to supply water to industrial users. Retrofitting the system with larger diameter pipe is planned (Forsberg, 1989), which will alleviate any impact from the RMF.

Hill and Michael staging bases

Peak water use for construction of the Mission Control Center (MCC) and other facilities at Hill AFB would peak at about 540 acre-ft in 1995. Water use will average about 155 acre-ft per year during the seven years of construction (1991 to 1998).

The amount of water to be used for ECTC construction at Hill AFB and Michael Army Airfield (AAF) is small compared to area consumption. For example, annual water consumption for Ogden, Utah, which is near Hill AFB, is estimated at about 21,000 acre-ft (Ogden City Water Utility, pers. comm., 6/21/89). The average annual amount of water to be used at Hill AFB for ECTC construction (about 155 acre-ft) represents only 0.74 percent of the total water used annually in Ogden.

4.10.1.2 Operation

Water use for operation of the ECTC is estimated at about 200 acre-ft in 1991, increasing gradually to 2,300 acre-ft by the year 2000

when the ECTC becomes fully operational. Annual water use will remain at about 2,300 acre-ft after the year 2000.

Most of the water during operations will be used for domestic purposes at the staging bases and at the RMFs. Water at the staging bases is believed to be available from existing water-distribution systems, although the Wendover system is currently near capacity. Water for the RMF and other range facilities is expected to be supplied from an existing or new well, depending on the valley selected.

4.10.2 ALTERNATIVE VALLEYS

Snake and Whirlwind valleys are open to new ground water appropriations. The amount of water required for construction and operation of the ECTC in either of these valleys is virtually the same as that described under the proposed action in Tule Valley (see Section 4.10.1). Given the small amount of water required by ECTC activities in Snake and Whirlwind Valleys, no impacts are expected to occur to regional water availability.

4.10.3 ALTERNATIVE PRIMARY STAGING BASES

4.10.3.1 Wendover

If Wendover is chosen as the primary staging base, construction would begin in 1994 and end in 1999. Water use for construction and culinary purposes during this period would peak at about 1,350 acre-ft and would average about 350 acre-ft.

Operations at a Wendover staging base would require about 275 acre-ft of water annually from 1992 to the year 2000. After 2000, annual water requirements would be approximately 550 acre-ft.

Ground water is abundant for both construction and operation of a staging base at Wendover. Currently, however, the water-distribution system in Wendover has limited ability to supply water to industrial users (see Section 4.10.1.1).

4.10.3.2 Salt Lake City International Airport (SLC)

Water requirements for staging-base construction at SLC would peak in 1996 at about 850 acre-ft. Water needed for operations would average about 225 acre-ft annually from 1992 to 2000, and would reach a peak of 500 acre-ft during 1997. After 2000, annual water use would remain steady at about 425 acre-ft.

The annual volume of water required for construction and operation of a staging base at SLC is small compared to the regional availability of water in the Salt Lake City area; no impacts to water resources are expected from construction and operation of a staging base at SLC.

4.10.3.3 Delta and Fillmore

Water required for construction of a staging base at Delta would average about 650 acre-ft annually, and peak at about 1,720 acre-ft during 1995. A staging base at Fillmore would require about 590 acre-ft of water annually, with peak use of about 1,560 acre-ft during 1995.

Water requirements for operation of a staging base at either Delta or Fillmore are the same as those described for Wendover (see Section 4.10.3.1).

Water is believed to be available for construction and operation of a staging base at either Delta or Fillmore.

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4.10.3.4 Michael AAF

Water required for construction of a primary staging base at Michael AAF would average about 525 acre-ft annually from 1993 to 1999, and peak at about 1,700 acre-ft during 1995.

Annual water requirements for ECTC operations at Michael AAF would gradually increase from 5 acre-ft in 1991 to 410 acre-ft by 2000. Average annual water use during this period would be about 200 acre-ft.

Water is believed to be available for construction and operation of an ECTC staging base at Michael AAF.

4.10.3.5 Remote staging

If a remote staging base is developed, no ground water withdrawals would be required in west-central Utah for the ECTC.

4.10.4 MITIGATION

Any water appropriations granted by the State Engineer to the Air Force for the ECTC will follow all stipulated conditions of the permit to avoid potential adverse environmental impacts to existing water users. Additional mitigation is not needed.

4.10.5 UNAVOIDABLE IMPACTS

No impacts are expected to either water availability or water quality from the ECTC program. As much as 3,900 acre-ft per year of water, however, would be unavailable for other potential uses because of the ECTC.

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4.11 HEALTH AND SAFETY

(Received 7/11/89: not reviewed)

1. RADIO FREQUENCY RADIATION

.1 **Background:**

Radio frequency (RF) detection and ranging (radar) was invented just prior to the beginning of World War II. In the 50 years since then it has evolved into one of the most effective tools of modern warfare. Most simply put, the reflection of a radio beam, off a solid object returning to a radio receiver can indicate how distant that object is. One can also tell where the object is (relative bearing) and how high it is (altitude). Radar makes it possible to know exactly where an enemy airplane, ship, or tank is, even in darkness, fog, or at a range beyond eyesight. Knowing where the enemy is before he knows where you are is an advantage (you can get off the first accurate shot). This realization has forced the pace of development of electronic warfare ever since World War II.

The effectiveness of linking anti-aircraft radar to anti-aircraft missiles and guns was graphically displayed in Vietnam. Our opponents learned the advantages of linking their radars to a central command post that could track an aircraft and 'hand him off' to the next tracking radar. This would soon give an indication of the aircraft's true course and allow the calculated dispatch of interceptors of the launch of surface to air missiles. We, in turn, quickly developed capabilities to jam radars and target their transmissions with homing missiles.

To be able to reflect a radio wave off a small, distant, moving object a lot of energy has to be transmitted in a tightly focused beam. Radio waves are focused into radar 'beams' for efficiency. Some radars rotate the beam in a full circle in a search mode

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(search radar). Some radars sweep the beam back and forth in a given sector (target acquisition radar). Some radars 'lock on' and follow a moving target with the beam (homing or tracking radar).

This high power radio frequency radiation (RFR), known as "non-ionizing" radiation, as distinguished from "ionizing" radiation. Ionizing radiation, such as X-ray or nuclear radiation, has higher energy and shorter wave length and may cause permanent changes in the molecular structure of the material exposed to the radiation. The Electronic Combat Test Capability (ECTC) does not involve any ionizing radiation. Non-ionizing radiation, on the other hand, agitates the molecules, temporarily elevating the temperature of the exposed material, but otherwise imposing no permanent change. The principal health hazard of RFR, or non-ionizing, is the heating of an object exposed to high levels of RFR, just as food is cooked by a microwave oven. Depending on the level and duration of exposure on a living being such as an animal or human, the health impact can range from a small sensation of warmth to fatal overheating.

One way of defeating radar is to drown out or trick the return echo with a louder or false signal. This "jamming" results in numerous signals broadcasting simultaneously and creates a broad spectrum of radio noise, and is another effect of operating the ECTC arena. It has the potential of disturbing other military and civilian radio users and is known as radio frequency interference (RFI).

A seldom discussed, but potentially hazardous effect of these RFR emissions are their potential to detonate explosive devices that are ignited electrically. These devices, such as blasting caps, are referred to as electroexplosive devices (EEDs).

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Because these RFR issues have far reaching public and operational concerns, the following discussion will describe how missions are run through the ECTC, how operations might affect human and animal health, and the effect on other radio and TV users and EEDs in the region.

ECTC - RFR Description

Test events at the ECTC will be prescheduled and the threat sites (radars) manned for the test run. For a typical test, one or several friendly "blue" aircraft will approach the appropriate valley from the south in a scheduled time window. Acting as an enemy "red" early warning network, one or several search radars, which have been turned on for the test, will locate the "blue" aircraft. As the aircraft fly north, additional "red" radars will be turned on the track to track the aircraft if necessary. The "blue" attack aircraft may also turn on their jammers or drop chaff (radar reflective fiber) to try to avoid detection. Other "blue" aircraft in the area may support the attack aircraft with search radar or jammers.

This entire mission, from start to finish, should last no longer than half an hour. Most of the radars, jammers, etc. would be transmitting RFR for only minutes at a time.

ECTC RFR sources include:

- o Ground based threat systems (radar)
- o Airborne countermeasure systems (jammers)
- o Airborne threat systems (radars)
- o Ground/airborne airspace reconnaissance radars
  - oo Gapfiller radar
  - oo AWAC systems
- o Microwave data links

One ECTC-RFR source which operates at UTTR today is the 'gapfiller' radar network. These gapfiller radars are similar to the Salt Lake City International Airport's Air Traffic Control (ATC) radar facility located on Francis Peak in the Washatch mountain range. The UTTR gapfiller radar network is just what its name implies, it fills the radar gaps (crafted by mountain shadowing) in the UTTR air traffic control system. When these radar gaps are filled military aircraft can test and train in a safe and well managed (radar controlled) airspace environment. Because the ECTC proposal will increase low level flight operations in the south range, additional gapfiller radars are being added to this network as an airspace control enhancement.

Airborne RFR threat systems are cousins to the ground based RFR threat systems. They are normally less powerful RFR sources but are extremely accurate when employed as an enhancement to airborne weapons systems.

To evaluate the success of new RFR technology in today's air combat test environment, data retrieval on test performance is essential. It is not enough to run an aircraft or a new piece of equipment through a test scenario. The test managers need to know if the plane or equipment performed as well as it was designed to. If not, what capabilities failed and which succeeded. To monitor test performance the range is equipped with radars, etc., that are neither "red" nor "blue". These radars monitor tests and transmit test data to a Mission Control Center (MCC) located at Hill AFB. A considerable amount of UTTR test data is complied as real-time data. This means that test information is transmitted electronically to the MCC as it happens. This real-time test data (or information) is presently transmitted by microwave from the range to the Range Operations Center (ROC).

Because ECTC will require capacity to transmit more data than is available at Hill AFB and because much of the ECTC data must be transmitted during periods of electromagnetic interference, the UTTR proposes to shift from its existing microwave data links to fiber optic cable data and communication links. See Section _____ for additional information on the fiber optics system for UTTR, and specifically for ECTC.

.3 Analysis of Impacts

For national security reasons the specific frequency and power capacities of 98% of the systems evaluated are classified. Fifty-one ground based systems and four airborne systems were analyzed.

.3.1 Approach/Assumptions

For purposes of analysis the ground-based RFR threats main beam and the surrounding terrain were assumed to be at 0° elevation (horizontal). In order to establish a "worst case", rotating radar systems (ground based RF emitters) were evaluated as if the main beam was fixed in one direction while the system continued to transmit. Each radar system's main beam and side lobe characteristics were evaluated.

The US Air Force School of Aerospace Medicine, Radiation Sciences Division, analyzed the transmission frequencies and power densities of each of the 51 ground based systems to determine at what distance the system exceeded the Permissible Exposure Limit (PEL). Similar analyses for RF interference and unintentional EED activation were performed by the Electromagnetic Compatibility Analysis Center (ECAC) and the Air Force Aeronautical Systems Division (ASD), Air Force Command, respectively.

The 51 ground based systems that were analyzed will utilize seven segments of the electromagnetic spectrum between 20 megahertz (20 MHz) and 15.35 gigahertz (15.35 GHz). Radiated main beam signal levels from the ECTC systems will not exceed 115 decibels (115 dBm) for systems below 1 GHz and 140 dBm for systems above 1 GHz. Radiated side lobe levels will not exceed 85 dBm for systems blow 1 GHz and 90 dBm for systems above 1 GHz. The antenna heights ranged from 7' to 131' above ground.

The normal operating exposure to electromagnetic radiation would be extremely short, as the rotating type antenna-beam only points in any given direction for a brief instant. Because the PELs are based on average exposure over a six minute period, personnel and equipment will be reasonably unaffected when in close proximity to such an antenna under "normal operation conditions." However, under "worst case conditions" where the antenna has stopped rotating for some reason or when the antenna is the fixed, non-rotating type, a much greater safe distance may be required.

Each analysis was conducted to point out any potential health hazards, potential RF interference, and potential EED activation during "normal operations" of the equipment and during a "worst case" scenario. Each analysis was chartered to establish the safe, noninterference distances from each ECTC-RFE system's (ground/airborne) antenna thereby determining the acceptable operating distance for each RFR system with respect to the above concerns.

.3.2 Health Impacts

People have a finite tolerance for electromagnetic radiation impinging on the body. The fundamental problem is that certain combinations of high-power and/or high frequency electromagnetic radiation are readily absorbed by the body tissue.

Sufficient heating of body tissue in this manner can be dangerous. Moreover, some body tissue is more sensitive than other tissues to electromagnetic radiation exposure. Safe exposure levels are usually determined on the basis of the most sensitive tissue. In addition, certain electronic medical aids like heart pacemakers or other implanted devices may be adversely affected by these intrusive electromagnetic penetrations. They may either act erratically or cease to function altogether.

The maximum electromagnetic radiation limits for the human body strongly depend upon the frequency of the radiating source. There is a frequency region between 30 MHz and 300 MHz where personnel tolerance for electromagnetic radiation is at a minimum, representing a PEL of about 1 milliwatt per square centimeter (1.0 mw/cm^2). Frequencies outside that range, all other things equal, will have less effect.

RFR is a common phenomenon generated by all equipment running on or producing electricity. Typical RFR exposures which the public encounter may include:

Thunderstorms	0.3 mw/cm^2
On-board marine radar	1 to 10 mw/cm^2
115v electric blanket	10 mw/cm^2
Coffee maker @ 1 foot	10 mw/cm^2

The Environmental Protection Agency (EPA) in 1986 tabulated a list of median exposures to RFE for various cities in the United States. The highest median exposures occurred in Portland, Oregon; Boston and Atlanta, with exposures of approximately 0.02 mw/cm^2. There are currently no federal standards for limiting exposure of the public to non-ionizing radiation. Some states and local governments have issued standards, these include: Alaska, California, Massachusetts, Oregon, Rhode Island, Texas, and

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Vermont. Because of the widespread use of electricity and electronics in industry much research has been focused on determining a permissible exposure limit for workers routinely exposed to RFR for extended periods of time.

The primary source of guidance in setting safe levels with respect to RFR. Exposure is the American National Standards Institute (ANSI) C95.1-1982, American National Standard Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz. Based on a compilation of over thirty well documented research papers, the ANSI committee agreed that adverse effects of acute exposures are associated with whole-body specific absorption rates above 5 watts per kilogram (w/kg), while whole body absorption rates below 4 w/kg did not demonstrate a hazard. To ensure a wide margin of safety, an order-of-magnitude reduction in the whole body averaged specific absorption rate was made yielding a standard limiting value of 0.4 w/kg.

Department of Defense (DOD) Instruction 6055.11 and Air Force Occupation Safety and Health (AFOSH) Standard 161-9 regulate the permissible exposure limits to RFR. These documents use the guidelines described in ANSI C95.1-1982 as their basis. Therefore, they require limiting exposure to persons in unrestricted (publicly accessible) areas to a PEL of 0.4 w/kg, whole body specific absorption rate as averaged over any 6 minute period of exposure.

Using the known threat system frequencies, their power settings, and a worse case antenna transmitting in a horizontal, fixed position, it was determined that 18 of the 51 ground based threat systems exceeded the PEL 50 feet from the transmitter. Since each site will have a perimeter fence at least 50 feet from the threat system, systems which would not exceed the PEL beyond the fence would pose no health risk.

Thirty-two of these systems can operate without constraint. Eighteen systems will have constraints imposed upon their operations to achieve the PEL standard at the fence line. Operational constraints could include one or more of the following: increase the antenna height above ground, restrict the minimum elevation angle, impose redundant fail-safe RFR transmission cut-off mechanism if rotation ceases, and reduce to a safe operating level the threat's authorized power setting. According to Air Force policy, no system will be turned on until it meets a site specific AFOSH PEL standard. In a preoperational analysis, all RFR emitters will have their PELs instrument-measured to ensure that they meet Air Force occupational health standards. For those RFR emitters which are unable to meet the proposed site limitations, operational design constraints are required. As new systems are specified, they will be evaluated through actual system test measurements and will be subject to the same health standards.

Airborne radar systems, with the exception of terrain-following radar, are aimed at the horizon or forward of the aircraft and not at the ground. Distances calculated for the safe operation of forward-directed airborne systems do not exceed a limiting distance of 400 ft (main beam, direct line distance) and will not contact the ground within this distance. Hazard distances for terrain-following radar (aimed at the ground) are considerably less than the minimum flight altitude of 100 ft AGL. Helicopters are not equipped with high powered radar systems, and even though they are capable of hovering or stationary air operation, will not pose a health hazard.

The effects of RFR on ground-dwelling wildlife are expected to be minimal. The PELs that control emissions to unrestricted areas (i.e., to prevent biological hazards to humans) will also prevent biological hazards to animals in the vicinity of the radar systems except possibly those which can broach the fence, and then only

those directly in the main beam or side lobe of a fixed or malfunctioned rotating antenna. Birds, bats and flying insects would be severely impacted if they fly directly within or along the main beam of a system emitting a frequency that is harmonic to their particular size. A bird or bat in flight would fly through a radar beam instantaneously unless it flew down (or along) the beam for several seconds. The distances for potential impact to animals will vary considerably depending on the characteristics of the system and the size of the specie. Some avian species have shown an aversion to RFR in test studies and many show avoidance of these systems. Disturbances in behavior, including migration habits, or reproduction will be minimal, based on field studies.

The effect of RFR on plants will be minimal. The measurable effect of RFR on native vegetation will primarily be thermal and are considered insignificant when compared to the thermal fields normally encountered from the sun.

Biological hazards to personnel operating RFR systems at ECTC are precluded or minimized through training and procedures associated with RFR system safety guidelines. A summary of the potential impacts of RFR expected at the ECTC are shown in Table 8.

.3.4 EED Impacts

Because there are devices and materials which are initiated (ignited) by a surge in electron activity, an analysis of the affects of ECTC-RFR on such devices was performed. The safe separation distances required between the proposed systems and electroexplosive devices (EEDs) were found to extend beyond the proposed 100' x 100' fenced site for most of the 51 RFR ground

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Table 8. Summary of the Effects from the Radiofrequency Radiation Emitting Systems

	Source of RFR Causing Possible Effects		
Effects	Threat Systems	Aircraft	Other RF systems
Biological Hazard			
To Man	potential	no	no
To wildlife	potential	no	no
Electromagnetic Interference	potential	potential	no
EED hazard			
to military	potential	no	no
to public	potential	no	no
Flammable vapors	no	no	no

based emitters. The EEDs of concern include blasting caps used in mining operations, and electroexplosive systems on aircraft (weapons, fire suppression systems, jettison systems, ejection systems, and back-up fail safe systems). Volatile fuel vapors within containment vessels were not shown to have the same RFR hazard as EEDs. Table 7 lists the RFR hazard distances for safe EED separation.

Because EEDs used by the public and the military may be hazarded by RFR emitters, operational mitigations similar to those discussed in Section 4.3 are required. Information on the likelihood of inadvertent ignition of fuel vapors in transport or in storage vessels near or on the flight path of proposed RFR emitting aircraft have been inconclusive. To ignite such fuel vapors a

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Table 7

Hazard Distances for Electro-Explosive Devices

	Number of Threat Systems affecting:		
Hazard Distance (ft)	Exposed EEDs	Transport/Storage EEDs	Installed EEDs
0-50	25	33	40
51-200	23	24	12
201-500	11	9	5
501-2000	20	15	9
2001-4000	3	5	4
4001-10000	6	3	2
10000-20000	1	0	0

Operating frequencies: 0.015 to 18.0 gHz
Average transmitter power: 1 to 8.0×10^5 watts
Antenna Gain: 1 to 49 dB

Calculated using AFR 127-100 methodology

spark must be introduced within the containment vessel. There were no circumstances or conditions discovered which might allow an RFR emitter source to create or induce such a scenario. Further analysis was considered unwarranted.

.3.3 Radio Frequency Interference (RFI) Impacts

Because the ECTC-RFR emitters will utilize all segments of the radio frequency spectrum, there will always be a potential for commercial, federal, and private broadcast reception interference. Tables 5 and 6 list registered systems and assigned frequency bands which may be affected by ECTC-RFR emitters. Although the spectrum of users is extensive, the period or actual test duration for the majority of test scenarios is only minutes.

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The selection and use of RFR emitters (may be incompatible with local communication frequencies) is based on known foreign RFR systems. It is a mistake to believe that frequencies can be (should be) made to deconflict for all scenarios. For ECTC to function as intended, it must be able to operate its RFR threat in the RF background of the Great Salt Lake Desert environment. There will certainly be broadcast interference from ECTC-RFR operations, see Section .4.2 for proposed mitigations. A preliminary interference analysis is being prepared by ECAC for use in ECTC frequency negotiations with the FCC and FAA.

.4 Introduction to Mitigations

The Air Force will minimize the negative RFR impacts from ECTC operations that are unsafe or unhealthy. These concerns will be resolved to the Air Force's, FCC's, and FAA's satisfaction before the first ECTC RFR emitter system is made operational. The local RFR interference impacts ECTC operations may have on communications, air traffic control, and entertainment broadcast will, because of their nature and the solutions required by this type of concern, dictate an ongoing, routine, formal dialogue between the operations of ECTC, the FCC and the FAA. The Air Force will provide technical assistance to resolve unique RFR interference problems.

To comprehend the magnitude of this commitment, an appreciation of the pre-ECTC RFR emitter environment is required. For all of the RFR broadcast is today's Salt Lake Desert environment, state and federal agencies are not the major contributors. A complete listing of licensed RFR operators within a 150 mile radius of the Salt Lake City basin, listing one frequency licensee per line, fills a continuous computer printout which is thicker than the Salt Lake City business telephone directory.

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Table 5. Summary of frequency assignments that may be affected by interference

Frequency Band (MHz)	Primary Allocated Services	Percent of Assignments NG	G
19.99 to 74.5 MHz Band			
35.0-36.0	Land Mobile	12	0
40.0-42.0	Fixed, Mobile	0	80
42.0-46.0	Land Mobile	25	0
47.0-49.6	Land Mobile	40	0
54.0-72.0	VHF TV Broadcast	7	0
remaining	Various	16	20
146.0 to 173.2 MHz Band			
148.0-149.9	Fixed, Mobile	0	14
150.8-156.24	Land Mobile	75	7
157.45-161.57	Land Mobile	23	0
161.00-161.775	Land Mobile	1	0
162.00-173.2	Fixed, Mobile	0	71
remaining	Various	1	0
335.4 to 450.0 MHz Band			
335.4-399.9	Fixed, Mobile	0	6
400.15-406.1	Meteorological Aids, Space Operations	100	10
406.1-410.0	Fixed, Mobile, Radio Astronomy	0	26
410.0-420.0	Fixed, Mobile	0	36
remaining	Various	0	2
614.0 to 902.0 MHz Band			
614.0-806.0	TV Broadcast	Note[3]	N/A
806.0-92.0	Land Mobile	100	N/A

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Table 5. Summary of frequency assignments that may be affected by interference (Continued)

Frequency Band (MHz)	Primary Allocated Services	Percent of Assignments NG	G
1990.0 to 4200.0 MHz Band			
1990-2110	Fixed, Mobile	70	
2110-2200	Fixed	350	
2200-2290	Fixed, Mobile, Space Research	070	
2700-2900	Aeronautical Radio-navigation, Meteorological Aids	029	
3700-4200	Fixed, Fixed-Satellite	540	
remaining	Various	41	
5925 to 8450 MHz Band			
5925-6425	Fixed, Fixed-Satellite	70	
6525-6875	Fixed, Fixed-Satellite	670	
6875-7075	Fixed, Fixed-Satellite Mobile	230	
7125-8400	Fixed	0100	
remaining	Various	30	
14.50 to 15.35 GHz Band			
14.500-14.7145	Fixed	N/A8	
14.7145-15.1365	Mobile	N/A92	
15.1365-15.3500	Fixed	N/A0	

Notes:

NG = non-government assignments
G = government assignments

1. These bands include three separate amateur bands. The quantity of amateur bands within these bands is not reflected in the NG percentages.

2. These bands include one amateur band. The quantity of amateur assignments within this band is not reflected in the NG percent.

3. There are 6 assignments in this band for Channel 6 (803 MHz).

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Table 6. Frequency bands of systems potentially impacted by interference from the ECTC

FAA safeguarded bands:

335.4-399.9 MHz (FAA air traffic control to the military)
2700-2900 MHz (airport surveillance radars)
7125-8400 MHz (radar microwave communication links)

FAA communications bands for the UTTR for fixed and mobile services for government non-military (primarily for communications)

169.0-170.0 MHz

Frequency bands utilized by over 15,000 registered land mobile assignments

161.625-161.775 MHz
806-902 MHz

Land mobile bands allocated for public and industrial safety

35.0-36.0 MHz
42.0-46.0 MHz
47.0-49.6 MHz
150.8-156.2475 MHz
157.45-161.575 MHz

Amateur bands

24.89-24.99 MHz
28.0-29.7 MHz
50-54 MHz
146.0-148.0 MHz
420-450 MHz
2300-2310 MHz
2390-2450 MHz
3300-3500 MHz

VHF and UHF television broadcast bands

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The combined RFR systems employed by units operating from Hill AFB/Range and Dugway Proving Ground comprise only 660 frequencies. These include 3 fixed site radars, 2 gapfiller radars (2 additional under construction), 42 mobile radars, 13 microwaves, 17 fixed site radars, 200 mobile radios, 20 telemetry systems, 80 Hamot systems, and 298 fixed and mobile radios operated by Dugway Proving Ground.

.4.1 Health Mitigation Measures

The RFR systems proposed for ECTC include the short range tactical threat radars and the powerful long range strategic search radar systems. For the majority of the test scenarios, the most powerful RFR systems are located on and immediately adjacent to DOD land. These sites and their RFR health hazard zones were purposely located on natural knolls. A strategic threat complex is proposed for a small parcel of public lands on the northeast edge of UTTR's South Range, south of the interstate and west of the Cedar mountains. Existing land and airspace use at the UTTR are reasonably compatible with the proposed ECTC threat system sitings, the primary concerns are those threat sites required for intermediate and short range RFR emitters located on 100' x 100' parcels of public land south of Dugway Proving Grounds and the alternate strategic threat area previously mentioned. The following mitigations represent the range of alternatives available to the ECTC test engineer for designing a realistic test scenario without causing RFR impacts.

- o Locating RFR systems on natural sites with side slopes between 0° and -5° to eliminate the main beam and side lobe PEL concern for all but one of the 18 RFR emitter systems known to produce health concerns.

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- o Fix the RFR emitters lower operating bounds (degrees above the horizon) so that the hazardous PEL limits do not extend beyond the site's 100' x 100' fenced perimeter.

- o Increasing the height of the transmitter mast antenna or platform to reduce its reported PEL hazard distance.

- o Electronic or mechanical shielding of local site conditions which violate the safe PEL distance for the proposed RFE emitter can tailor the proposed system to permissible operating conditions.

- o For RFR emitters which require motion or rotation mechanisms, the calculated PEL hazard can be eliminated if the RFR transmitter is designed to cut the power should the motion mechanism fail. Redundant transmitter-motion failsafe mechanisms are required to guarantee immediate transmitter shutdown.

For every threat scenario (multiple threat sites selected for a single unique test) there are multiple safety mitigation alternatives. The above mitigations are representative of the RFR emitter adjustments available to protect the uninformed from health hazards they cannot see. Other safe-operation measures employed at every RFR emitter site include:

- o Perimeter warning signs located on the fenced site.

- o At the gated site entrance, a radio phone will be posted with use instructions for contacting the site engineer prior to entering the restricted area.

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.4.2 RFI Mitigation Measures

As previously described, the RFR emitters proposed for use by ECTC will often be required to operate at frequencies which are normally dedicated to non-DOD users. The following RFR interference mitigations are available to the ECTC test engineer in preparing a non-interference test scenario:

.4.2.1 Ground Rules

FAA-FCC approval is required for ECTC to operate any of its RFE emitters. Approval documents require very specific data: proposed RFR emitter frequency, power levels, pulse width, location, time of day, direction of transmission, and elevation (MSL) of RFR antenna.

.4.2.2 Proposed RFR Interference Mitigations

For RFR operations which may cause partial or complete interference to local communications, airspace control radar or entertainment broadcast, the test operation will be scheduled during hours of non-interference. When such measures are impractical or inappropriate for the particular test scenario requirement, a positive, redundant test-stop procedure may be authorized by the FAA-FCC to allow ECTC operations which may affect local life-safety communication networks. Such procedures are not uncommon in attempting to mitigate frequency management interference.

When local RFR interference is predicted, test RFE emitters will operate at non-interference power levels instead of their full power potentials. For airborne RFR jammers, lower operating altitudes will be employed along with lower power levels to promote interference containment within the test valley. Whenever possible, threat systems with broad interference potential will be

located on sites with the greatest potential for containing the emissions.

.4.3 EED Mitigation Measures

A seldom discussed, often overlooked concern associated with RFR emitters is their potential to induce an electroexplosive device (EED), unintentionally activating the EED and thereby causing an associated accident. There are two potential EED users in the vicinity of the proposed RFE sites, mining activities, and military aircraft subsystems. For both EED users, there are related standards of safety. EEDs for mining activities (blasting caps) are loosely regulated by the Institute of Makers of Explosives who publish the Safety Guide for the Prevention of Radio Frequency Radiation Hazards in the Use of Electric Blasting Caps. The Air Force standard for dealing with EEDs is its Explosives Safety Regulation 127-100. An analysis of the RFR emitter systems proposed for ECTC indicates that the potential for EED ignition extends well beyond the proposed restricted area perimeters of the ground based threat sites. A similar evaluation of airborne RFR emitters resolved that there were no hazards to local EED users due to low flying test aircraft. A very limited overflight exposure time prevents an EED in storage, transport, or installation from receiving a critical measure of induced energy.

In a separate analysis, the effects that ground based RFR emitters may have on airborne EEDs was evaluated. The concern that an airborne EED may inadvertently ignite during a head-on, low-level RFR threat neutralizing scenario was envisioned.

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The above concerns for EED accident prevention have resulted in the following mitigations:

- To the extent practicable, RFR emitter siting will avoid active mining areas.

- To the extent practicable ground based RFR emitters will be sited so that their RFR-EED hazard standoff will not affect EEDs being transported on local public roads (excluding threat site access roads).

- All roads leading to the test area will be monitored prior to and during RFR emitter tests. Test activities will be halted by the range controller if EED transport is suspected.

- Airborne EED systems will be adequately shielded on all low-level mission aircraft to ensure against an inadvertent EED ignition during its overflight of an RFR threat emitter.

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Table 1. Examples of the typical uses of equipment generating radiofrequency radiation

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Frequency Use Occupational Exposure

below 3 MHz metallurgy; eddy current metal workers,
melting, tempering; radio transmitter
broadcasting, radio- personnel
communications, radio-
navigation

3-30 MHz various industries; factory workers;
car, wood, chemical, furniture veneering
food industries for operators, plastic
heating, drying, welding sealer operators,
gluing, polymerization, drug and food
and sterilization of sterilizers, car
dielectrics; agriculture; industry workers,
food processing; medical personnel,
medicine; radio- broadcasting trans-astronomy; broad-
mitter and television
casting personnel

30-300 MHz industries listed above; same as above
television, air traffic
control; radar radio-
navigation

300-3000 MHz TV, radar (troposcatter microwave testers;
and meteorological); diathermy operators;
microwave point-to-point; medical personnel;
telecommunications tele- broadcasting trans-metry;
medicine; micro- mitter and television
wave ovens; food indus- personnel; electronic
try; plastic preheating engineers and techni- cians;
air crews;
missile launchers; radar mechanics,
operators, and main- tenance workers

3 - 30 GHz altimeters; air- and physicists; microwave
ship-borne radar; development workers,
navigation; satellite radar operators;
communication micro- marine and Coast
wave point-to-point Guard personnel;
sailors, fishermen,
and persons working
on shipboard

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Table 1. Examples of the typical uses of equipment generating radiofrequency radiation (Continued)

Frequency	Use	Occupational Exposure
30-300 GHz	radiometeorology; space physics; nuclear physics and techniques; radio spectroscopy	physicists; micro-research; wave development workers; radar operators

(based National Health and Welfare, Canada 1977)

Table 4. Calculational Methods for EED Safe Distances

Frequency	Formula for Recommended Safety Distance
EED in Exposed Condition - Worst Case	
≤ 20kHz	$D = 0.093 (P_t G_t)^{1/2}$
20kHz-2MHz	$D = 4.631 (P_t G_t)^{1/2}$
2MHz-48.5MHz	$D = 9.26 (P_t G_t)^{1/2}$
48.5MHz-4.85GHz	$D = (450/f) (P_t G_t)^{1/2}$
4.85GHz-45GHz	$D = 0.093 (P_t G_t)^{1/2}$
EED in Storage or Transport	
Metal Container	
all frequencies	$D = 0.093 (P_t G_t)^{1/2}$
Non-Metal Container	
≤ 63kHz	$D = 0.093 (P_t G_t)^{1/2}$
63kHz-2MHz	$D = 1.46f (P_t G_t)^{1/2}$
2MHz-48.5MHz	$D = 2.93 (P_t G_t)^{1/2}$
48.5MHz-1.53GHz	$D = (142/f) (P_t G_t)^{1/2}$
1.53GHz-45GHz	$D = 0.093 (P_t G_t)^{1/2}$
EED in Installed Configuration	
all frequencies	$D = 0.093 (P_t G_t)^{1/2}$

f = frequency in MHz

Reference: AFR 127-100, Explosives Safety Standard, rev 8-10-88

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Table 3

Dervived Equivalent Permissible Exposure Limits for Unrestricted Areas

Frequency (MHz)	Power Density (mW/cm^2)	Electric Field (V^2/m^2)	Magnetic Field (A^2/m^2)
0.01-3	100	400,000	2.5
3-30	$900/f^2$	$4000(900/f^2)$	$0.025(900/f^2)$
30-300	1.0	4000	0.025
300-1500	f/300	4000(f/300)	0.025(f/300)
1500-300,000	5.0	20,000	0.125

NOTES:

Values were derived using a value of the impedance of free space of 400 ohms. This value is rounded up from the generally accepted value of 377 ohms to allow for ease of calculations under ANSI 95.1-1982.

When both the electric field and magnetic field are measured, both values must be equal to or less than their applicable derived equivalent PEL.

Power density (W/m^2) = E^2 / 377 = 377 H^2
where E is the electric field strength in volts/meter
and H is the magnetic field strength in amps/meter

Source: DOD Instruction 6055.11 and AFOSH 161-9

Table 2

Radiofrequency Protection Guides

	Frequency	Power Density	Electric
Field	Magnetic Field		
(MHz)	(mW/cm^2)	(V^2/m^2)	(A^2/m^2)
ANSI C95.1-1982			
0.3-3	100	400,000	2.5
3-30	$900/f^2$	$4000(900/f^2)$	$0.025(900/f^2)$
30-300	1.0	4000	0.025
300-1500	$f/300$	$4000(f/300)$	$0.025(f/300)$
1500-300,000	5.0	20,000	0.125
IRPA Guidelines for the General Public			
0.1-1	----	7569	$0.053/f$
>1-10	----	$7569/f$	$0.053/f$
>10-400	0.2	756.3	0.005
>400-2000	$f/2000$	$1.89f$	$1.37\times10^{3}\ f$
>2000-300,000	1	3721	0.0256

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2. MISHAPS

The Utah Test and Training Range (UTTR) is a major Air Force center for aircrew training and aircraft systems testing. There were approximately 27,000 sorties flown in the UTTR in 1988. The ECTC proposal would add to the number of sorties flown, with the first appreciable increase, approximately 4,500, in 1994. The expected annual total attributable to the ECTC would reach approximately 8,000 by the year 2000. The large number of flights in the range and the associated high-performance maneuvering required for realistic test and training create some risk of accidents with potential for associated property damage or injury to persons residing in the area.

Information on all Air Force aircraft mishaps is maintained by the Air Force Inspection and Safety Center (AFISC), Norton AFB, California. Information furnished by AFISC on mishap rates by aircraft type and individual mishap summaries was used to estimate mishap rates for particular types of mission (e.g., on a range) for this EIS. The analysis of mishap rates was based on the information available for all mishaps occurring during the ten year period from 1979 to 1988. (Information on the years 1987 and 1988 is not complete, so final mishap rates for those years have not been published by AFISC. However, preliminary estimates indicate that they will be similar to the immediately previous years.)

Mishap rates are reported as mishaps per 100,000 hours of flying time. In the last 10 years, Air Force aircraft have logged 3.1 - 3.5 million hours of flying time per year. Major mishaps (defined as those resulting in more than a specified dollar amount of damage to Air Force equipment) during those years ranged between 1.5 per year to almost 3 per 100,000 hours with the more recent years falling in the 1.5 - 2.0 per 100,000 hour range.

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Precise analysis of mishap occurrence by aircraft location (e.g., at UTTR) or activity (e.g., on a practice bombing run) is not possible using available information because mishap reports and analysis gathered by the Air Force focus on specific causes, rather than the environment in which the aircraft was operating. It is possible, however, to make reasonable estimates of the distribution of mishaps for some general classification of flying activities.

Most major mishaps (70 - 75%) occur on or within five miles of the runway. The majority of those are takeoff or landing accidents. A significant number are ground handling and maintenance accidents (e.g., an aircraft burning on the ground). Of all major mishaps occurring more than five miles from the runway, more than half (50 - 60%) occur on ranges and MOAs. The general category of Air Force flying activity with the highest mishap rate is high-performance maneuvering such as that at UTTR.

The major mishap rate over the last 10 years for aircraft operating in ranges and/or MOAs is approximately 1.5 per 100,000 hours. That rate excludes mishaps occurring within five miles of the runway, but includes mishaps from all causes, i.e., mechanical failures as well as loss of control or mid-air collisions. That rate, calculated using mishap data for all Air Force aircraft worldwide, is very similar to the rate experienced at UTTR over the past 11 years. During those years, approximately 350,000 hours have been flown during missions in the UTTR. There have been 6 crashes on the range, for a rate of approximately 1.7 mishaps per 100,000 hours.

To estimate the risk from ECTC flying activities to individuals living in or near the UTTR, the major mishap rate was used to predict the probability of a crash on the range. That probability was then multiplied by the probability that the aircraft, on impact, might injure or kill a person on the ground. In that

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calculation, the population in the area was considered to be spread uniformly across the range. That is a very conservative assumption because the activities over unpopulated DOD-owned land are more likely to result in a crash than is the case for activities on the fringes of the range.

The total area covered by the UTTR is approximately 17,000 square miles. The rural population density (i.e., excluding towns and cities) in the counties underlying the UTTR is 0.4 person per square mile. The zone of probable injury around a crash was estimated to be a circle 0.1 square mile in area (approximately 1,900 feet in diameter). That assumption, that anyone within 950 feet of the point of impact would be injured or killed, is also conservative.

The risk to an individual was estimated using the following formula:

Risk = Rate . Hours . Pop Density . Impact Area

In that formula "Rate" is the number of major mishaps per 100,000 hours of flying time estimated for MOAs and ranges. "Hours" is the number of hours expected to be flown on ECTC missions per year, based on the assumption that the mission will average about one and one-half hours flying time. "Pop Density" is the total number of people estimated to live within the 17,000 square miles of the UTTR divided by the area. "Impact Area" is the 0.04 surface miles estimate to be the zone of potential injury from a crash.

For the year 1994 and after, the increase in risk to an individual living under the range is estimated to be 1 in 2 million per year.

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Chapter 5

CONSULTATION AND COORDINATION

5.1 PUBLIC AND GOVERNMENT AGENCY PARTICIPATION PROCESS

5.1.1 SCOPING PROCEEDINGS

The Air Force initiated the public scoping process for the Electronic Combat Test Capability (ECTC) Environmental Impact Statement (EIS) by filing a Notice of Intent (NOI) in the Federal Register on October 7, 1988. A total of six public-scoping workshops were held on the ECTC EIS; one each in Ogden, Delta, Ibapah, Callao, and Tooele, Utah, and one in Wendover, Nevada. The workshops were held during the week of November 14-18, 1988. In addition to these workshops, a meeting was held at Dugway Proving Ground for the residents of Dugway and Skull Valley, Utah. Public officials, Native American groups, and interested organizations and individuals were sent written notification of the time and location of each workshop. The general public was informed of the proceedings through press releases and public notices that were provided to each town. Participants, as well as those that were unable to attend the meetings, were encouraged to submit written comments on the proposed action, to raise concerns, and to identify issues to be addressed in the EIS.

A technical scoping meeting was also held with Federal and state agencies on December 14, 1988, in Salt Lake City, Utah. Agencies and public officials represented at this meeting included the Bureau of Land Management (BLM), the Utah State Lands and Forestry Division, the Utah Division of State Lands, and the Utah State Science Advisor. Participants reviewed the EIS approach and clarified the requirements and procedures for acquiring both rights-of-way to BLM lands and leases to state lands for ECTC facilities.

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5.1.2 PUBLIC HEARINGS

5.2 ISSUES HIGHLIGHTED BY THE PUBLIC AND GOVERNMENT AGENCIES

5.2.1 SCOPING

During the scoping process, virtually every resource area was addressed by the public and government agencies. Environmental concerns were concentrated around seven issues: ecological resources; cultural resources; access to and use of public lands; access to special-use airspace; noise and sonic-boom effects; adverse and beneficial socioeconomic impacts; and public health and safety, including the health effects of electromagnetic emissions. The cumulative impacts of the ECTC were brought up as an issue at three of the six workshops.

Both the Nevada and Utah offices of the U.S. Fish and Wildlife Service (USFWS) submitted written comments that included concerns for unique wildlife and wildlife habitats (i.e., wetlands). The Utah office supplied a list of endangered, threatened, and candidate species, and migratory bird species in the affected area that are of special ecological significance. The BLM submitted a list of issues and concerns including access to public lands and existing and proposed new roads, ECTC facility locations, and conflicts with existing land uses. Additional correspondence concerning the ECTC EIS was received from Utah's Department of Health, the Millard County Commissioners, the Downwinders, and Citizens Alert and Rural Coalition. Issues discussed in the correspondence fell into the same categories as those that were brought up during the scoping meetings.

In an informal consultation process, the Air Force sent letters of introduction to the Nevada Department of Wildlife and to the Utah State Division of Wildlife Resources that included an ECTC program

description, an Air Force point-of-contact, and requested comments from the agencies on any potential species or areas of interest in the ECTC study area.

Issues identified during the scoping process and their distribution are summarized in Figure 5-1. Although not brought up during scoping (and, therefore, not listed on Figure 5-1), the effects of the ECTC project on air quality were evaluated and presented in this EIS.

5.2.2 PUBLIC HEARINGS

5.3 CONSULTATION REQUIRED BY ENVIRONMENTAL REVIEW LAWS AND EXECUTIVE ORDERS FOR THREATENED AND ENDANGERED SPECIES AND CULTURAL RESOURCES

In accordance with 40 CFR 1501.6, the BLM signed a Memorandum of Agreement with the Air Force on March 9, 1989, giving the BLM cooperating-agency status on the ECTC program. To fulfill this status, the BLM has attended numerous technical exchange meetings, and has reviewed and commented on the Final Program Plan and Scoping Summary Report for the ECTC program. The BLM has also provided detailed wildlife-habitat information for the ECTC study area.

Through correspondence and technical exchange meetings, the Air Force has provided both the Nevada and Utah offices of the USFWS with an ECTC program description, including detailed maps of projected ground activities, and has requested threatened and endangered (T&E) species listings for the ECTC study area. In accordance with the Endangered Species Act, the Air Force has used

ISSUES	NEVADA	UTAH						
	WENDOVER	DELTA	IBAPAH	CALLAO	TOOELE	DUGWAY PROVING GROUND	SALT LAKE CITY	WRITTEN COMMENTS
THREATENED AND ENDANGERED SPECIES		X					X	X
WILDLIFE MANAGEMENT INCLUDING WILD HORSES & MIGRATING BIRDS		X		X			X	X
IMPACTS TO GREAT BASIN NATIONAL PARK & UTAH WSA's	X	X		X			X	X
VISUAL RESOURCES AND AESTHETICS	X			X			X	
CULTURAL RESOURCES							X	X
IMPACTS TO NATIVE AMERICAN LANDS AND SOVEREIGNTY								X
LOSS OF ACCESS AND USE OF PUBLIC LAND		X	X			X	X	
LIVESTOCK GRAZING; LOSS OF AUM(S), NOISE IMPACTS AND TRAFFIC HAZARDS	X	X	X				X	
POTENTIAL CONFLICT WITH PROPOSED 500KV IPP POWERLINE IN TULE VALLEY	X	X	X	X			X	
CONFLICTS WITH CURRENT MINING OPERATIONS AND FUTURE DEVELOPMENT		X					X	
QUARRY LOCATIONS AND EXTRACTION OF MATERIAL FOR ROAD IMPROVEMENT/CONSTRUCTION							X	
LOCATION OF AIR FORCE POWER SUPPLY FACILITIES TRANSMISSION LINES, FIBER OPTICS							X	
AIRSPACE: SPECIAL USE AREAS - BOUNDARY CHANGES	X	X						
IMPACTS TO UTTR MISSIONS AND RANGE USE	X	X						
OVERFLIGHT RESTRICTIONS INCLUDING VIOLATIONS IN SUPERSONIC, LOW-LEVEL, "BUZZING"	X	X		X		X	X	X
USE OF CHAFF, FLARES AND LIVE ORDNANCE	X	X	X	X				
AIR TRAFFIC IMPACTS ON CIVILIAN AVIATION INCLUDING AIRPORT ACCESS		X		X	X			X
IMPACTS OF NOISE AND INCREASED NUMBER OF SONIC BOOMS	X	X	X	X	X			X
IMPACTS OF LOCAL EMPLOYMENT OPPORTUNITY; ECONOMIC GROWTH		X	X	X				X
IMPACTS OF URBAN AND RURAL POPULATION INCREASE							X	X
IMPACT TO PRIVATE PROPERTY VALUES	X			X				
IMPACT TO PUBLIC SERVICES INCLUDING MEDICAL, POLICE, FIRE		X						
NEED FOR NEW ROADS, MAINTENANCE AND ACCESS	X	X		X			X	X
IMPACTS OF INCREASED TRAFFIC, MILITARY AND RECREATIONAL	X	X	X	X			X	
IMPACTS TO QUALITY OF LIFE		X	X					
HEALTH AND SAFETY EFFECTS OF ELECTROMAGNETIC RADIATION-HUMAN, LIVESTOCK, WILDLIFE		X	X	X				X
ELECTROMAGNETIC EMISSION INTERFERENCE TO TELEVISION AND TELEPHONE	X	X		X		X		
ELECTROMAGNETIC EMISSION INTERFERENCE TO RADIO, HAM AND CB COMMUNICATIONS	X	X		X		X		
POTENTIAL FOR ELECTROMAGNETIC EMISSIONS TO TRIGGER MINING EXPLOSIVES	X	X						
EFFECTS OF LASER OPERATIONS - REFLECTION OFF INCIDENTAL GLASS								X
AIRCRAFT CRASHES OVER POPULATED AREAS WITH OR WITHOUT LIVE ORDNANCE		X		X				X
IMPACTS OF TRANSPORTATION OF HAZARDOUS MATERIALS	X	X						
WATER RESOURCES		X		X				X
CUMULATIVE IMPACTS OF ECTC	X	X		X				

Figure 5-1. Issues raised during the scoping process.

these listings during programmatic valley surveys and detailed site assessments to determine if any T&E or special interest species exist within potential ECTC-related ground-disturbance zones.

Agency coordination for cultural resources investigations included letters of introduction to the Advisory Council on Historic Preservation and the tribal councils of the Goshute, Pahvant, and Ute tribes. The Air Force also arranged to give each of the tribal councils an introductory presentation that detailed the ECTC project and how tribal representatives could contribute to the ECTC study. Cultural resources field investigations were summarized in a detailed report that was submitted to the BLM and State Historic Preservation Office.

5.4 FEDERAL PERMITS AND OTHER ENTITLEMENTS NEEDED FOR THE ECTC PROGRAM

Table 5-1 lists the Federal permits and other Federal regulatory approvals that may be required for construction and operation of the ECTC. None of the permits has been applied for as yet. Applications will be filed after the Record of Decision is published and when detailed engineering design plans are available.

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Table 5-1. Requirements for construction and operation of the ECTC.

Permit	Regulatory Authority	Agency
Free Use Permit for use of sand and gravel from public lands.	Materials Act	Bureau of Land Management
Special Use Permit for fiber-optic line through Fish Springs National Wildlife Refuge.	National Wildlife Refuge System Administration Act	Fish and Wildlife Service
Rights-of-Way for access to and use of public lands for threat sites, roads, radar, power lines, etc.	Federal Land Policy Management Act	Bureau of Land Management
Air Quality Permit for surface disturbances.	Clean Air Act	Environmental Protection Agency (via the State of Utah)
Radio frequency broadcasting.	Interstate Commerce(?) Act	Interstate Commerce Commission

[a] Issuance of Rights-of-Way by the BLM will be according to land management policies established in the Federal Land Policy and Management Act, and will be consistent with laws such as the Wild Horses and Burros Act and the Taylor Grazing Act, which are administered primarily by the BLM.

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Chapter 6

LIST OF RECIPIENTS

Nevada Congressmen - Local Offices

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To be located

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Washington D.C. Office of Sen. Bryan
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Washington, D.C. 20510

Carson City Office of Sen. Reid - Wendell Newman
705 N. Plaza, Suite 104
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(702) 882-7343

Las Vegas Office of Rep. Bilbray - Mark Fierro
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Las Vegas, NV 89102
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Elko Office of Rep. Vucanovich - Pete Ludwig
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(702) 738-4064

Utah Congressmen - Local Offices

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Ogden Office of Sen. Hatch - Norma S. Holmgren
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Native American Tribes

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Women's Conservation Council of Utah
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Chapter 7

PROJECT MANAGEMENT TEAM AND LIST OF PREPARERS

7.1 PROJECT MANAGEMENT TEAM

This document was prepared by the Air Force Regional Civil Engineers, Ballistic Missile Support, Colonel Dwight B. Cavender, Commander.

This document was prepared under the direction of Lt. Colonel Thomas J. Bartol, Director, AFRCE-BMS/DEP and Mr. John Sollid, AFRCE-BMS/DEPV.

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GLOSSARY

Acre-Feet - Unit of measure equal to the volume of water in a one acre area one foot deep.

Alluvial Fan - Fan shaped accumulation of sediments carried from higher elevations and deposited as elevational gradient and water velocity diminishes.

Atmospheric Absorption - Attenuation of sound as it propagates through the atmosphere greatest loss is of higher frequencies especially under hot and dry condition.

Attainment - Air quality term indicating that concentrations of certain pollutant(s) are within nationally prescribed standards. Non-attainment conditions exist when pollutant levels exceed National Ambient Air Quality Standards (NAAQS).

Attenuation - To reduce in strength, force or an amount.

Avionics - The science and technology of electronics applied to aeronautics and astronautics.

Basin and Range - Region of north-south trending mountain ranges with broad flat valleys between them. The region encompasses western Utah, Nevada, western and southern Arizona, and southeastern California.

Bajada - Upper portion of an alluvial fan closest to the source material.

Caldera - A large crater formed by volcanic explosion or collapse of a volcanic cone.

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Chaff - Airborne fibers of fiberglass with an aluminum coating used to confuse an enemy electronic targeting system.

Deceniennial - Of or pertaining to a ten year period.

Decibel - Unit of sound measurement.

Demography - The study of the characteristics of human populations, as size, growth, density, distribution, and vital statistics.

Electronic combat - The use of radio frequency emitters to interfere with the operational capabilities of assault and/or defense units.

Environmental Impact Statement - National Environmental Policy Act (NEPA) related document prepared for use by decision makers in which various impacts of a proposed project are analyzed, possible mitigation measures considered, and comments incorporated from affected agencies and the public.

Eocene - Oldest geologic epoch occurring during the Cenozoic era ranging from 58 and 36 million years ago. Characterized by the rise of mammals.

Evapotranspiration - Water lost from plant surfaces, as a function of gas exchange and leaf cooling.

Fault - A break in the continuity of rock caused by the shifting of the earths crust.

Fiber Optics - Transmission of light through very fine glass rods, incorporated as bundles into cables and used for communication purposes, not subject to electromagnetic disturbance.

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Flare - Magnesium pellets that are ignited upon discharge from an aircraft, used to give false readings to heat seeking sensors such as anti-aircraft rockets.

Flight Avoidance Zones - Geographic areas over which overflights are avoided in order to minimize environmental or social perturbations; such a towns and wilderness study areas.

Forb - Herbaceous plants, not including the grasses, especially one growing in a field or meadow.

Gram - Metric unit of mass equal to 0.035 ounce

Ground Attenuation - Reduction in sound wave force due to contact with ground surfaces and vegetation.

Hacking - The controlled release of young raptors during the period of development from fledgling to independence.

Hydrocarbons - Compounds containing hydrogen and carbon atoms volatile forms are often principle causes of air pollution.

Igneous - Rock formed by solidification from a molten state.

Infrastructure - The Basic facilities, equipment, services, and installations needed for growth and functioning of a country, community or organization. Government or administrative apparatus.

Intrusion - The forcing of molten rock into an earlier formation.

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Jurassic - Geologic period occurring during Mesozoic era between 180 and 135 million years ago. Characterized by the existence of dinosaurs and the appearance of primitive mammals and birds.

Knot - Unit of speed equal to 1.15 statute miles per hour. A distance of one nautical mile.

Magma - The molten matter under the earths crust from which igneous rocks are formed by cooling.

Mesozoic - Geologic era; time occurring from 230 million years ago to 63 million years ago. Characterized by the predominance of reptilian life forms. Time of the dinosaurs.

Meter - Metric unit of length equal to 3.37 ft.

Microgram - Metric unit of mass equal to one one-millionth of a gram; $1x10^{-6}g$.

Military Operations Area (MOA) - Airspace of defined vertical and lateral dimensions established outside positive control areas to separate/segregate certain military activities from instrument flight rules (IFR) traffic and to identify visual flight rules (VFR) traffic where these activities are conducted.

Military Training Route (MTR) - Airspace of defined vertical and lateral dimensions established for the conduct of military flight training at airspeeds in excess of 250 knots.

Miocene - Geologic epoch occurring during the Cenozoic Era between 25 and 13 million years ago; characterized by the appearance of primitive apes, whales and grazing animals.

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Mitigation - Actions taken to minimize or offset the effects of an action considered under an environmental impact statement.

Oligocene - Geologic epoch occurring during the Cenozoic Era between 36 and 25 million years ago.

Ozone - Compound consisting of three oxygen atoms; comprises a major component of air pollution.

Paleozoic - Geologic era; time occurring from 600 million years ago to 230 million years ago. Characterized by the appearance of marine invertebrates, primitive fish, land plants and primitive reptiles.

Petroglyph - Figures and symbols scratched or pecked onto rock surfaces by Native Americans.

Phreatophyte - Plants with deep root systems penetrating to permanent water, often associated with sub-surface discharges and faults.

Physiographic Province - Geographic area of uniform geology.

Pleistocene - Geologic epoch occurring during the Cenozoic Era beginning one half to 2 million years ago and ending 11 thousand years ago. Characterized by the alternate appearance and recession of northern glaciation and the appearance of the progenitors of man.

Prostrate - Plant growth form; growing flat, low along the ground.

Raptor - Bird of prey, e.g., eagle, hawk, owl.

Rural - Of or pertaining to the country as opposed to the city.

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Socioeconomics - The study of economic, demographic, social, public service and finance, and quality of life impacts of a proposed project.

Sonic Boom Carpet - Longitudinal pattern created by a sonic boom following the path of a supersonic aircraft. Represents the exposure zone on the ground of the sonic boom; is usually several miles wide and is centered upon the ground track during straight and level flight. Dimensions are horizontal without vertical components.

Sortie - One aircraft mission with one take-off and one landing.

Spherical Spreading - Attenuation of sound as it radiates from a source.

Staging base - Location from which ECTC sorties originate.

Standard Temperature and Pressure - Constant conditions to which volume measurements are converted equal to 760mm of mercury (sea level pressure) at 273°K (0° centigrade).

Strata - A bed or layer of rock having the same composition of rock throughout.

Strategic Site - The ultimate target of an assault mission.

Super boom - Highly localized sonic booms associated with maneuvers of supersonic aircraft; are stationary in nature and do not follow the aircraft.

Supersonic Operating Area (SOA) - Restricted regions where flights at greater than the speed of sound are allowed.

Tactical Site - Sites to be overflown/overcome enroute to the ultimate target of an assault mission.

Tectonic - Pertaining to, causing or resulting from structural deformation in the earth's crust.

Tertiary - Geologic period occurring during the Cenozoic era from 63 million years ago to between 2 million and 500,000 years ago characterized by the appearance of modern flora and apes and other large mammals.

Threat Site - Location for electronic threat systems, approximately 150 ft by 150 ft, will be fenced, have supplied power, and fiber-optics line.

Threatened and Endangered Species (T&E) - Plants and animals included on the National Register are defined in the Endangered Species Act of 1973 [Section 3 (4)] as "any species which is in danger of extinction through all or a significant portion of its range; the term threatened is defined [Section 3 (15)] "as any species which is likely to become an endangered species within the foreseeable future...".

Urban - Of or pertaining to the city as opposed to the country.

Wilderness Study Area (WSA) - Areas possessing wilderness characteristics were established under the Federal Land Policy and Management Act of 1976. The areas are to be maintained in their original condition and are to be considered for inclusion in the National Wilderness Preservation System.

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ACRONYMS

AAF	Army Airfield
ACHP	Advisory Council on Historic Preservation
ACM	Air combat maneuvers
ADD	Average daily departures
AFB	Air Force Base
AFFTC	Air Force Flight Test Center
AFOTEC	Air Force Operation Test Evaluation Center
AGL	Above ground level
AIRFA	American Indian Religious Freedom Act
AUM	Animal unit months
AWACS	Airborne warning and control systems
BLM	Bureau of Land Management
BMGAFR	Barry M. Goldwater Air Force Range
CCC	Civilian Conservation Corps
CEQ	Council on Environmental Quality
dB	Decibel
dBA	Decibel based on A-weighted sound level
dBm	Decibel with respect to a reference level of 1 milliwatt
DOD	Department of Defense
DPG	Dugway Proving Ground
EC	Electronic combat
ECTC	Electronic Combat Test Capability
EED	Electroexplosive device
EIAP	Environmental Impact Analysis Plan
EIS	Environmental Impact Statement
EM	Electromagnetic
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FCC	Federal Communications Commission
FLPMA	Federal Land Policy and Management Act
FTE	Full-time equivalent
GAO	General Accounting Office
HAFB	Hill Air Force Base
HAMOTS	High-accuracy multiple-object tracking system
HC	Hydrocarbon
IOC	Initial operating capability
IPP	Intermountain Power Project
IR	Instrument route
ITA	Intermediate threat area
LANTIRN	Low altitude navigation and targeting infrared for night
LDV	Light duty vehicle
LOS	Level of service
LTO	Landing and take-off
MAAF	Michael Army Airfield
MCC	Mission control center
mg/l	Milligrams per liter

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ACRONYMS (Continued)

mg/m^3	Micrograms per cubic meter
MOA	Military operations area
MOU	Memoranda of Understanding
MRTF	Major Range and Test Facility
MRTFB	Major Range and Test Facility Base
MSL	Mean sea level
MTR	Military training route
NAAQS	National Ambient Air Quality Standards
NAS	Naval Air Station
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NWR	National Wildlife Refuge
NWC	Naval Weapons Center
O&M	Operations and maintenance
PEL	Permissible exposure limit
ppm	Parts per million
psf	Pounds per square foot
RFR	Radio frequency radiation
RMF	Range maintenance facility
ROI	Region of influence
ROW	Right-of-way
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SETTA	Southeastern Test and Training Area
SIP	State Implementation Plan
SLC	Salt Lake City International Airport
SOA	Supersonic operating area
STA	Strategic threat area
T&E	Threatened and Endangered
TDS	Total dissolved solids
TDY	Temporary duty
TFWC	Tactical Fighter Weapons Center
TSP	Total suspended particulates
TSPI	Time, space, and position information
TTA	Tactical threat area
UDWR	Utah Division of Wildlife Resources
USFWS	U.S. Fish and Wildlife Service
UTTR	Utah Test and Training Range
VMT	Vehicle miles traveled
VR	Visual route
VRM	Visual resource management
WSA	Wilderness Study Area

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